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The Possibility of a Science of Education

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THE POSSIBILITY

OF A

SCIENCE OF EDUCATION

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BY

SAMUEL BOWER SINCLAIR

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THE POSSIBILITY OF A SCIENCE OF EDUCATION.

CHAPTER I.

INTRODUCTION.

CAN there be a science of education as there is a science of mathematics, of physics, of medicine, or of ethics; are there educational facts or principles capable of discovery and systematization which are so fundamental, universal and important as to differentiate educational science from every other; and, further, is a study of such educational science of service to the educator by furnishing him with instruments of insight which will be valuable in the determination of the true purpose of education and of ways and means to its attainment? This, in brief, is the problem submitted for investigation.

No argument is necessary to demonstrate the important practical bearing of the problem proposed. Its solution affects in a most profound and vital way every phase of educational procedure. More especially is this true in regard to the preparation of teachers. If the foregoing questions are answered in the negative, the so-called professional training of teachers is "a delusion and a snare," and had better be dispensed with. On the other hand, if an affirmative answer should be given to these questions every teacher, from the kindergarten to the university, would be rendered more efficient by a certain quantum of a suitable kind of preliminary professional training.

The problem is an old and familiar one and has in some form or other received the attention of scholars and practical men from the earliest times.

With the modern scientific movement the subject has naturally come prominently into the foreground of public consciousness, and has received extended and scholarly treatment at the hands of many eminent philosophers and scientists.

The view advocated by many of these writers—especially by university men—is, in brief, that science being abstract and universal, and the child concrete and individual, there can be no science of education properly so called; and, further, that as knowledge, natural aptitude and successful experience are the prime requisites of the successful teacher, pedagogical training is unnecessary and may do more harm than good.

Public sentiment, however, which history has proved to be at times more sane than current philosophy, has persisted in a constantly-increasing demand for more thorough and continued professional training on the part of the teacher.*

The increased attention given to the subject during recent years in all civilized countries is phenomenal, and would seem to indicate an almost universal sentiment in favor of the importance of, and necessity for, such training; *e.g.*, in the Province of Ontario, Canada, the annual government grant for teachers' salaries and other expenditure, not including buildings, in such professional schools was in 1870, $17,169.74; in 1890, $52,532.00; in 1900, $74,518.00.

The demand for professional training, formerly confined almost exclusively to the elementary school, has recently

*It must be admitted, however, that there are evidences to show that in many, perhaps the majority of, cases citizens have no very clearly-defined reasons to assign for this additional burden of taxation, and, in cases where the selection of a trained instead of an untrained teacher involves personal financial loss or the sacrifice of private interests political or otherwise, the results are often such as to indicate that sentiment in favor of professional training has not become sufficiently ingrained to form a strong motive for action. As an example we may cite the conditions which obtain in the State of Illinois. In the report of the State Superintendent of Education (June, 1901) we find (p. 15) that Illinois has two normal universities and two normal schools with a total government expenditure of $293,398.48, and yet that (p. 43) "not one teacher in five has been either liberally educated or trained in a state normal school." The report also shows (p. 3) that the lowest salary paid for a male teacher is $12.50 per month, and for a female teacher $8.00 per month.

made itself felt in connection with the high school, and in compliance with this demand many universities have established departments of education.

In the educational world, as along other lines of human activity, the necessity for coöperation is being realized as never before. The university, the secondary and the elementary schools are beginning to see that the interests of each are bound up in, and dependent upon, the success of the others. The low estimate of university training formerly entertained by many teachers of elementary schools is rapidly giving place to a feeling of true appreciation, while, at the opposite pole, ignorance of the elementary school system of one's country is not now considered a *sine qua non* for scholarly reputation.

In no case is this change of attitude from one of disregard to one of sympathetic and attentive consideration more evident than in the interest shown by university men in the problem here under discussion.

With a view to determine in a general way the opinion held by university professors regarding the VALUE of professional training for teachers I prepared a circular and sent it to presidents and heads of departments of American universities considered to be most representative. Sixty-three replies were received. Of these nine were from presidents of universities, and with only four exceptions the remainder were from heads of departments. Thirteen replies were from professors of the department of philosophy, eleven from natural science, eight from classics, five from mathematics, four from English, six from teaching and seven from other departments. The replies from professors of teaching departments are not included in this report.*

The following is a summary of questions submitted and replies received :—

* For statements of views held by professors in teaching department see report of the committee on "The Certification of College and University Graduates as Teachers in the Public Schools" in *The School Review*, June, 1899, The University of Chicago Press.

1. Do you consider that the present system of professional training, *e.g.*, Normal Schools or University Department of Pedagogy, is desirable for teachers in
   (*a*) Elementary Schools? Affirmative answers, 28; negative, 3.
   (*b*) Secondary Schools? Affirmative answers, 28; negative, 9.
   (*c*) Universities? Affirmative answers, 20; negative, 17.
2. Do you consider that a system of Professional training could be devised which would be desirable for teachers in
   (*a*) Elementary Schools? Affirmative answers, 43; negative, 3.
   (*b*) Secondary Schools? Affirmative answers, 43; negative, 3.
   (*c*) Universities? Affirmative answers, 31; negative, 11.
3. Do you think it possible to place the training of teachers upon a Scientific Basis? Affirmative views, 27; negative, 2.

Many of those who answer in the affirmative point out that they do so with the reservation that in the first question reference is to the better type of existing training-schools, and in the third to a proper interpretation of the word "scientific."

Those who do not answer the categorical questions (and many who do reply to them) have been so good as to add written statements of their views on the general topic, and from these statements the following summary is made:

Forty-five out of fifty-seven favor the professional training of teachers. Of these a number would confine the training to a certain class, *e.g.*, teachers of elementary schools, and would reduce the time and content of the course to a minimum. One is opposed to all such training. Twenty-six emphasize knowledge of the subject to be taught, as an important, if not the most important, factor to be considered in a teacher's

preparation. Thirteen emphasize natural aptitude, vigorous personality, etc., as important factors. Five emphasize study under an able and inspiring teacher, as invaluable in such preparation. Four award the palm to successful experience. Twenty-two express the opinion that in many existing professional training-schools there is a tendency to depreciate one or more of the above-mentioned elements—knowledge, aptitude, observation, experience—and to substitute pedagogical methods as an equivalent. Eleven hold the view that professional training is most important for elementary school teachers, and that its value uniformly decreases as we ascend to higher levels in the system, until for university teachers it is of little or no value.

That so many of our ablest thinkers in the fields of science, literature and art, should have taken time to turn aside from their important duties, to express themselves so fully on the subject at issue will, I am sure, be a source of inspiration to those who, in humbler spheres, are endeavoring to render their teaching more efficient. That there should be such unanimity of opinion that method has been exalted at the expense of knowledge would seem to indicate that some training-schools, at least, have not been true to the highest ideals. It is also worthy of note that over ninety per cent. of those who replied, favor some form of professional training, although there is great diversity of opinion regarding the nature of the training which should be given.

As will be seen, nearly one half of those from whom replies have been received do not feel themselves prepared to express any opinion regarding the possibility of placing the training of teachers upon a scientific basis, while those who do reply in the affirmative do so with reservations differing widely in character.

On page 119 and subsequent pages will be found quotations from the answers received, incorporating the arguments *pro*

and *con.* Space does not admit of a complete statement of all the replies.

A consideration of the facts thus far referred to seems to suggest the need of further investigation of the problem.

In the following pages I have endeavored to establish the thesis that a *science of education is possible.* It will be observed that throughout the argument constant emphasis has also been placed upon the *importance of the professional training of teachers.* This seeming dual treatment is the logical outgrowth of the dynamic conception (subsequently explained) upon which the argument is based, a conception which holds that the relation of theory and practice is of such an intimate nature that neither can be divorced from the other. Further, this conception makes the criterion of the possibility of educational science to consist in its capacity to furnish insight in educational procedure, and I have, therefore, tried to show by somewhat extended and definite illustrations, ways in which such insight can be furnished.

In the attempt to arrive at a satisfactory solution regarding the problem proposed, I am not unmindful of the high character of the sources of the opinions from which I am obliged to differ. I am convinced that these opinions would have been greatly modified had their authors had time and opportunity to observe the improvement which invariably takes place in the teaching power of those who are being professionally trained in a truly scientific way.

Two articles on the subject of "Pedagogy as a Science" may be said to have become classical authorities owing to the philosophical character of the treatment and the eminence of the authors. The first is by Professor Dilthey, "Ueber die Möglichkeit einer allgemeingiltigen pedagogischen Wissenchaften," 1888, pp. 807-832. The second is by Professor Royce, "Is there a Science of Education?" *Educational Review,* 1891, pp. 15-121. Professor Royce reviews Dr. Dil-

they's article and expresses himself as substantially in accord with the views therein enunciated. Both writers conclude that there can be no science of education properly so called, but that valuable training may be afforded by a study of the history of education, biological science, etc.

The following quotations may serve to indicate the line of argument followed in Professor Royce's article:

"Scientific pedagogy, far from telling the teacher finally and completely just what human nature is and must be and just what to do with it, will be limited to pointing out what does, on the whole, tend toward good order and toward the organization of impulses into character. This is the whole province of pedagogy as a general science. Its applications to the conditions of a particular time, nation, family and child, will be a matter of art not of science. And, therefore, no concrete, educational questions can be solved in terms of a universally valid science. Such questions will always contain elements of uncertainty, will always require the practical skill of the individual educator and will always receive answers that will vary with time and occasion."

"Universally valid your 'system' never can be; therefore, hold it not as a system. But universally significant your scientific insight may become to you, if you once possess it, and can bear in mind that it is after all abstract, and yet noteworthy as an abstraction. Teachers, then, do need a scientific training for their calling. Instinct, unchastened by science, is blindly self-confident, and when it goes astray its fall from grace is irreparable; its very innocence then proves its doom. Teachers who know nothing of the reflective aspects of their calling, who do not try to comprehend as well as to love their pupils, who despise science because it cannot take the place of devotion and of instinct, may indeed be successful, and, in any case, their state, so long as by chance they do not go far astray, is vastly better than the present state of those pedants who have heard of modern science, of nerve cells, and of apperception, and who forthwith have developed or copied some hundreds of systematic principles of 'Pedagogical Method.'"

With most of the statements in the articles referred to, and in the subsequent writings of those who take a similar negative view—*e.g.*, in replies quoted p. 119—I heartily agree, but while hesitating to differ from such eminent authorities I beg to object to the definition of science upon which the arguments seem to have been based and to the conclusions deduced there-

from. The position which I attempt to defend is that such limited static view of science is incorrect and that the conclusions drawn from the application of such a view to education are untenable.

1st. Science is not so much a systematized body of knowledge, "universally valid" and finally fixed, as it is an accepted instrument of insight to furnish control over future experience. Nor are the principles of educational science rules to be "copied from a book" and immediately applied by the teacher without reference to the particular conditions of the "time, nation, family and child."

Educational theory is sometimes thus conceived as something over and above and isolated from individual experience, a sort of educational tourist guidebook which when once memorized will enable the teacher, without individual appreciation, deliberation or selection, to locate and place under the proper category all the phenomena of the classroom, to advance with copyrighted, ready-reckoner methods which will cover much ground in little time, and secure magnificent examination results; a pedagogical doctor-book, with rules to enable one to diagnose with certainty every disease and apply the only possible prescription for each particular case of difficulty as it arises.

I shall endeavor to show that as fact and law are but two aspects of the same operation, educational theory cannot thus be sundered from educational practice without becoming static, formal, lifeless. Educational theory is not so much a reflective and systematic account of things, a systematized body of knowledge, as it is an idea of something to be done. There is no such thing as education in general. It is always this particular individual who has to be considered and dealt with under these conditions at this present moment. There is always an activity possible to this learner which, as to form and content, is preferable to any other of the countless courses

of action open to choice. The problem is always how to reorganize this present experience in the best possible way. Our desire is to know this specific case in all its concreteness, to investigate, analyze, clarify, relate it, not that we may find some abstract rule under which it may be brought, some till into which it may be pigeon-holed, some mold in which it may be cast, but that we may see what this experience really is, that we may recognize the relationships in hand and respond to the demands of these relationships.

Educational theory is neither more nor less than educational insight, an analytic perception of the conditions and relations involved in a particular case, and accordingly the criterion of value of a course of professional training must always be the degree in which it enables the teacher to possess such clearer vision for the reconstruction of each new breakdown in experience.

2nd. Further, it is often urged that education is wholly an art, consisting of the application of a number of other sciences —biology, psychology, ethics, sociology, etc., and that if the teacher has attained a knowledge of these cognate sciences he has simply to apply this knowledge when he comes to teach. The view taken in the following pages is that education is an independent science, with phenomena and laws peculiar to itself, and that it may properly be considered to depend upon other sciences only in such a sense as chemical science may be said to depend upon mathematics.

Educational science finds its focus in its endeavor to gain control of the educational process. It views from this focal standpoint everything in proper perspective. It casts its tentacles into the sea of all auxiliary science, literature and art, and appropriates and assimilates that which is best fitted for its special requirements. It possesses a technique entirely different from that of any other science, a technique which can be mastered in the best way only when the teacher in training

studies it from a distinctly educational standpoint, and under conditions which furnish opportunities both for observation and for practice.

3rd. Again, the question of the advisability of the professional preparation of teachers is frequently discussed as though it were an alternative one in which professional training (usually of the objectionable type to which allusion has been made), on the one hand, is arrayed against a combination of knowledge, natural aptitude and successful experience, on the other. My contention is that this is not a correct or adequate statement of the problem, but that the real question at issue is to what extent, if any, will the teacher who possesses these preliminary essentials of knowledge, devotion, instinct, etc., be benefited by professional training conducted in a scholarly spirit and accompanied by actual contact with children.

I shall not attempt to defend the views which have been assailed in the cases referred to, but shall endeavor to show that in regard to each the attack has been made upon an empty fortress. Nor do I claim that present systems of training are perfect. It is admitted that much that has been written under the guise of educational science is anything but scientific, that too large a portion of what has been proposed as the final word on educational method is valuable only as a warning of method not to be followed, and that it is possible for a certain type of student to receive so-called professional training without gaining that culture which is always accompanied by the grace of humility.

There are graduates of teachers' training-schools for whom the clock of development in scholarship and culture stopped on the day when they received their diplomas. They never contribute anything to the cause of educational advance and the value of their schoolroom work varies inversely as the length of their experience. On the other hand, there are eminent university men who have never attended any institu-

tion for pedagogical training, who nevertheless in addition to the study and research work which have made them famous in their special departments have familiarized themselves with the best educational literature and have thought profoundly on educational subjects. Their lectures are models as regards matter and method and their utterances on educational questions have deservedly ranked them as leaders in true educational reform. The assertion that the former are trained teachers, and the latter untrained, is too absurd to be taken seriously. A specialist is not one who "says that he is," nor yet one who has certificates to show that he ought to be, but rather one whose actions when put to the test, demonstrate conclusively that he is master of the situation.

Perfection consists not in "a having and a resting," but in "a growing and a becoming." The difficulty of professional training consists not so much in developing a teacher who does good work at the beginning as in training him in such a manner that, possessing elements of growth, he may continue to increase in efficiency from year to year.

If a course of training has nothing to offer but a number of shibboleths and cut-and-dried methods of doing things, based on no other authority than that someone says they have worked fairly well in the past, it will be of little benefit to the student. On the other hand, if during a professional training course the teacher gains an insight which will enable him to originate his own methods, to reconstruct his own experience at every step so as to react in the best possible way, and also at the same time gains an impulse for further development, such training will be valuable from the standpoints of knowledge, discipline and culture, his efficiency as a teacher will be increased many times over, and what might have proved "the sorriest of trades" will become "the noblest of professions."

While admitting the imperfection of prevailing educational systems it may not be out of place to observe that charges

similar to the foregoing may be laid at the door of every other science or profession. The most ardent advocates of professional training for teachers are foremost in the demand for the correction of existing evils, and it is probable that all who have observed the trend of events will admit that great reforms are being accomplished. It is hoped that the following argument may prove sufficiently unprejudiced and practical to serve in some way in the furtherance of such advance:

GENERAL PRELIMINARY STATEMENT.—In order to clear the ground for future discussion, without attempting to define precisely the necessary qualifications of the teacher or the course of study most appropriate for training-schools, the following are suggested as general working hypotheses:—

I. *Minimum Teaching Qualifications.*

(*a*) That elementary school teachers possess a scholarship rank equivalent to that of the first year in our best universities, and high-school teachers to that of the A.B. degree.

(*b*) That in addition to the foregoing academic qualification (*before receiving* a permanent certificate to teach) two years of professional preparation be demanded, of which at least one year be spent in a training-school (normal school, college or university) and the remaining time devoted to teaching under competent supervision.

II. *Course of Study in Training-School.*

(*a*) Philosophical investigation of the general problem of education.

(*b*) History of education—comparative study of school systems.

(*c*) The following subjects studied from the standpoint of education:

1. History of civilization.
2. Ethics, sociology, political science.
3. Psychology (genetic), child-study, biology, physiology.

(*d*) School organization and supervision, school law.
(*e*) Study of educational classics.
(*f*) Methodology and didactics; review of subjects to be taught.
(*g*) Study of subjects necessary for the teacher but not previously learned; *e.g.*, hygiene.
(*h*) Observation and teaching in practice school.
(*i*) Experimentation in educational laboratory school.

CHAPTER II.

THE EMPIRICAL OBJECTION.

As has already been suggested the arguments of those who answer our questions regarding the possibility of a science of education in the negative, naturally fall under two heads: (1) That from the inherent nature of science and of education no science of education is possible. (2) That on the side of experience the attempt to give professional training to teachers is an attempt to substitute such training for what is more important and valuable, an attempt which is, therefore, certain to be disastrous to the highest efficiency.

I hope that in the discussion of the first objection, which is fundamental, the second, which is a development from it, will largely disappear. However, as the latter, which may be called the empirical form of objection, is the one which is usually first presented I shall refer briefly to several popular criticisms concerning it before proceeding to the main discussion of the first objection, which will be taken in succeeding chapters.*

1st. When a plea is made for the professional training of teachers it is sometimes urged in opposition that such a plea is based upon a desire to give to teaching a standing—social and scientific—to which in the very nature of things it is not entitled, that there is not, and never can be, a separate profession of teaching.

If the objection were simply one of social hierarchy it need not cause special concern in this democratic age. But the

*See article on "The Study of Education," by Prof. Findlay, *Government Educational Report*, London, Eng., Vol. II, p. 338.

objection has a much more important bearing, for this view that "anybody can teach school, that no professional preparation is necessary, that if a person can show that he has more knowledge than those to be taught it is quite safe to turn him loose upon a class," when applied in educational affairs produces two disastrous results.

(*a*) It reduces the remuneration for teaching to the level of that for unskilled labor. Indeed, it reaches a much lower limit, especially in primary work, where according to the opinion of many advocates of this theory "the knowledge to be poured in is easily gained and the hours are fewer than those for a domestic servant." The reference on page 2 to the case where in a comparatively wealthy community the teacher is paid only eight dollars a month is an illustration of this fact.

(*b*) It places incompetent teachers in the schools. As I shall endeavor to establish, in every grade of educational work from the kindergarten to the university, and more particularly on the elementary levels, there is a certain scientific attitude which is necessary for highest educational achievement, and which cannot be gained without careful and long, continued preparation on the part of the teacher. This is an age of specialists, and the best men are not likely to enter or continue in a work where, according to accepted public sentiment, there are no fields for research nor any criteria for advancement, and where the salaries are insufficient to provide even the simplest necessities of life. Such deflection is more apparent in the case of elementary schools, but cannot fail to be felt in other lines of educational work as well. The whole tendency of the objection, is, therefore, to debar teaching from attaining the high standard of efficiency which it might otherwise reach, by preventing from engaging therein any but those of mediocre ability who could not succeed in other more remunerative employments.

The objection to the possibility of raising teaching to the status of a profession often arises from an entirely different standpoint, however (a scholarly one), when it is argued that "a university man who has received a liberal education is *ipso facto* qualified to enter upon other careers in life." In so far as this means that as a preparation for life university scholarship and culture are invaluable the statement is undoubtedly true. It is worthy of notice that this argument was used against the proposal to demand professional preparation for law and for medicine, and has been abandoned in these cases as it will eventually be as regards teaching. The recent union of the secondary teachers of England in the formation of a profession, the resolutions of the Cambridge Conference in favor of the training of teachers, and the adoption of professional training of teachers by the governments of the most advanced nations, *e.g.*, Great Britain, France, Germany and the United States of America, are indications that this objection is now generally regarded as practically untenable.

2nd. The objection is sometimes made "that professionally-trained teachers are little or no better than untrained, that they are apt to be mechanical and unpractical, and to be lacking in originality and initiative." Such a statement can scarcely be verified or disproved by experiment. The facts, however, that the testimony of school supervisors is almost entirely against the objection, and that public sentiment, which does not continue to invest money for fads after they have been put to actual test for many years, is steadily giving more attention to the subject and support to such training, would seem to cast doubt upon the general accuracy of the statement.

The failure of a professionally-trained teacher is usually traceable either to a lack of aptitude or of preparation on entering the training-school, or to the inadequacy of the training given therein. That such failure sometimes does occur

emphasizes the fact that one of the duties of such a school is to see that those who are not naturally fitted for teaching, or who are illiterate or unworthy, are there directed into more appropriate lines of work.

3rd. The main objection made by scholarly men against professional training is, however, the one which in different forms appears so often in the replies received (p. 119), viz., "that if we demand professional training the knowledge and culture standard of teachers will be lowered." In reply the following points are submitted as worthy of consideration:—

(*a*) Underlying this objection there usually rests the oft-repeated assumption that "if a teacher knows his subject well he can teach it properly."

Probably no other view regarding education is so widespread and at the same time so opposed to the facts of everyday experience. To take a familiar example, a person may know the way from his house to the railway station so well as to walk the whole distance in the dark and yet be entirely unable, without careful reflection, to direct a stranger over the same road. A thoughtful, subsequent analysis of the explanation which one gives on such occasions usually proves a source of astonishment to himself, and the interpretation put upon his directions by his auditor, whose attitude he has not considered, is even a greater surprise to him. The more reflex and habitual the activity of the journey has become the more likely is he to offer rapidly a few random and unrelated directions, concluding with the illuminating phrase, "You can't miss it." The comparison of such explanation with the explanations given by many teachers to their students is not inappropriate. It will be admitted by many that it would be difficult to find teaching anywhere inferior to that done in many universities by young men with brilliant records for scholarship. A well-known university president of long experience recently made the significant remark that he

thought "no instructor without previous teaching experience should be appointed on a university staff until three years had elapsed after receiving his doctor's degree in order to allow him to come to earth again and to win his spurs in a less responsible position."

Again, the born teacher who is a profound scholar, but who has never thought upon educational problems, may, with the best possible intentions, use these special powers in such a way as to lead to failure. His vigorous personality, unbounded enthusiasm and apparently exhaustless resources of knowledge, render his classroom work a spontaneous overflow. His students are carried along as with a flood. Admiration and love give place to something akin to reverence. As was recently remarked in a public eulogy upon such a teacher, "His students had such implicit confidence in his knowledge, and such reverence for his opinion, that after leaving him they no longer cared to think for themselves. They were satisfied with the conclusions reached by a mind so much superior to their own, possessing a grasp and insight which they realized was so far in advance of anything they could ever hope to attain."

Now, my argument for professional training is not one which would minimize in the slightest degree the incalculable worth of such teachers. It holds that upon such a type the hope for the future of a country largely rests, and that no money is an adequate remuneration for such service. But it contends that the type is improved by training, that in the case referred to if the distinguished professor had spent some time in the consideration of educational problems he would have seen that all true education must be self-education, that one of the important things to be considered is how to have students form a habit of "thinking for themselves," and that it is a somewhat serious matter to find students standing erect and to leave them abjectly following on all fours.

This argument is no plea for ignorance on the part of the teacher. The contention of Jacotot and others that "one can teach what one does not know" is, except in a very limited sense, undoubtedly incorrect. Other things being equal the teacher of high culture and scholarship will always be a better teacher than one of lower scholarship, but professional training must not be omitted from the original equation. It will be noted that in the course outlined on p. 12 it is assumed as a basis for this argument that a minimum scholarship prerequisite should be demanded—of first year in an accredited university for elementary teachers, and of the A.B. degree for high-school teachers.

It is often justly urged that many of the best teachers did not receive professional training. While admitting the force of this objection we do well to remember two things: (1) The real question at issue is not did these teachers excel others, but rather would these teachers who were so signally successful without professional training have been still better teachers if they had received such training; and (2), in the majority of cases, these teachers possessed special opportunities which in a way furnished a substitute for such training.

In discussing this point Professor Findlay says, "The conclusion we draw is that some training is necessary to widen the mind and deepen the insight, even in the case of teachers gifted largely with sympathetic instincts, but such training is helpful only if it is conducted in close association with the life of children. This association must be intimate and continuous; casual lessons to strange children, odd visits to educational institutions, are of little advantage. It is worth observing that some of the most distinguished educational reformers owe much to opportunities of this description. Arnold when at Rugby displayed a wonderful understanding of the nature of sixth-form boys; it is sometimes forgotten that he had gained this experience by his life at Laleham

with a few boys at a time. Herbart had a similar experience as a tutor in the Stelger family; Froebel had charge of some of his nephews in the early part of his career, and Locke's philosophy of education was the outcome of his observations on one or two pupils."

(*b*) Further, it would be a sad commentary upon a training-school if it could be truly said that it did not in any way provide what a college course stands for. The subject is too extended for discussion here, but it is probable that those who are familar with the facts will agree that in the best professional training-schools the culture effect as regards both discipline and knowledge is equal to that of some colleges. The university student pursuing a post-graduate course in education does not find courses on the history or philosophy of education or on school organization, when treated by able professors, to be less scholarly or productive than those which he takes in other departments.

(*c*) Finally, this objection assumes that the time taken for professional training will be subtracted from that which would otherwise be devoted to scholarship training; *e.g.*, it assumes that a student in training for the position of teacher in a high school would substitute for one year of college work the year of professional training demanded. This hypothesis is, in my opinion, not verified by the results of school experience. The subject is a very wide and complex one containing many elements for consideration—*e.g.*, the fact that the new conditions tend toward making teaching a profession with a higher class of talent and better remuneration, thus making it a possible life pursuit, would be a spur to better preparation on the part of the teacher.

With a view to finding what actually does occur under such circumstances I have taken as an illustration the case of the high-school teachers of the Province of Ontario, Canada.*

*Under the head of high schools are included collegiate institutes which are advanced high schools.

The first time that professional qualification of any kind was demanded of high-school teachers in Ontario was in the year 1885 when a course of training of about four months was rendered compulsory by government regulation. This law continued in force with slight alteration until 1893 when the course was extended to a full year's attendance at the Ontario Normal College, and this is still the requirement. At no time has it been compulsory for a student of the Normal College or a teacher in a high school, with the exception of headmaster, to hold an arts degree. In the year 1893 there were 344 high-school teachers who possessed A.B. degrees and 190 who did not. In 1900 there were 427 who possessed A.B. degrees and 190 who did not.

Now, the example from 1893 to 1900 is exceptionally applicable to this investigation. A full year of attendance was demanded with subsequent interim teaching. The regulation was applied under the same conditions for the succeeding seven years, and it was at the student's option to enter with or without the A.B. degree. During these seven years we find an increase of eighty-three teachers who hold A.B. degrees and no increase in the number of those who do not.

The following statement from a high educational authority in Ontario describes the existing conditions :—

"The indications are that we shall soon have a regulation making university degrees and graduation at the Normal College imperative on every high-school teacher. After sixteen years of professional training of high-school teachers there are more honor graduates in the high schools than at any former period of its history. Further, a glance at the curriculum of each of the various universities will show that the academic standard has not been lowered, but rather increased. The idea that scholarship is lowered as professional training is increased cannot be considered as even a reasonable assumption."

The discussion in this chapter tends to show that with a rational system of professional training, and with its aims and methods clearly understood by the general public, all such empirical objections would disappear.

CHAPTER III.

THE DYNAMIC CONCEPTION OF SCIENCE.

LET us now return to a consideration of the main objection—that from the inherent nature of science and of education no science of education is possible. In our discussion everything depends upon what is meant by science and education. It is therefore necessary to find some satisfactory working agreement regarding the force of each of these terms.

The generally-accepted definition of science is that "it is a collection of the general principles or leading truths relating to any subject arranged in systematic order." The static interpretation often put upon this definition by those who have discussed the subject of educational science is inadequate to the full meaning of the term. True science is essentially teleological in character; it possesses a systematized body of knowledge, but systematized as instruments for the reconstruction of future experience. Facts, if there be such, which are fixed and unchanging, which exist outside of consciousness and which do not lead anywhere, are in no sense scientific no matter how thoroughly systematized, universal or absolute they may be considered to be. While taking this position it is not implied that abstraction, generalization, systematization and law, are terms to be discarded in scientific procedure; it is only in regard to the true significance of the terms that there is difference of opinion.

I hope to show that educational science possesses a body of systematized knowledge arrived at by processes of experimentation, abstraction, generalization, etc., but that such educational theory and the mode of its genesis must be looked

upon from the standpoint of *function*. As this distinction is vital to the discussion in hand I shall enter into a brief explanation of the superiority of the dynamic conception as compared with the static, and afterwards endeavor to show the bearing of the discussion upon the further educational problem.

Two clearly-differentiated views have been held regarding the meaning of the term "scientific." The first view is dualistic. It deals with types and categories and draws a definite line of demarcation between theory and practice. It views science as an organized body of knowledge, over and above and independent of individual experience, a series of fixed generalizations existing entirely isolated from the particular. It holds that the criterion of science consists in the independence and finality of the facts obtained, and depreciates the functional value of such facts; *e.g.*, Whewell (*Novum Organum Renovation*, p. 242) says:—"It is said with a feeling of triumph that knowledge is power; but in whatever sense this may truly be said we value knowledge not because it is power but because it is knowledge, and we wrongly estimate both the nature and the dignity of that kind of science with which we are concerned [inductive] if we expect that every new advance in theory will forthwith have a market value."

The second view, and the one substantially adhered to in this thesis, is teleological, dynamic, functional. It holds that it is impossible to divorce theory from practice. Scientific theory is always the theory of practice. It is the recognition of the relationships in hand, the cross-section of the given state of action to know what should be done. Everything would be indifferent if it were not for ends. The object of scientific investigation is to state controlling factors in the realization of ends. Science is necessary in order to economize effort, to determine the character of the ends proposed, to clear up the direction of the forward movement of experience.

According to this conception of science the view taken by Whewell in the foregoing quotation is incorrect; on the contrary, "we value knowledge" chiefly because it is power and not because it is knowledge. A fact which will never be of value in any way in future reconstruction is not worthy of high appreciation, nor is it really a scientific fact. We value truth because the "truth has power to make us free," *i.e.*, because it will enable us to rise superior to further obstacles. Nor does such value necessarily mean "market value." The mathematician who seeks truth for its own sake in the realm of pure abstraction may be lifted far above all commercial considerations; nevertheless his work is *purposive*. He values each new discovery mainly because of its relation to the past and future, because it enables him to play the mathematical game (if I may be allowed the expression) in a new and better way.

Scientific definition is a description of genesis. The mode of genesis in mathematical science is direct; in experimental science indirect, but the method of the idea is the same in both. We do not proceed from individual to universal, but from individual to individual through the universal. Mere sequence gives us nothing. By studying antecedent and subsequent events in experimental science we arrive at law, corresponding to a principle of construction in mathematics; *e.g.*, in physical science the principle of the conservation of energy, and in mathematics the general equation of the curve. Further, law is more than a mere description of what has happened; it has a teleological implication. It is an *abstraction made for the purpose of enabling us to control future experience.* It owes its interest and its formation to this fact. It is hypothetical and has normative value the moment it is recognized and stated. Its value lies in enabling us to get rid of confusion and irrelevant circumstances, and to simplify the process in the future. The moment you state the reasoning

process you get a rule, a something that helps for the next time.

The scientific attitude arose in the attempt to control processes of observation and interpretation, and to avoid error and get at a maximum of certainty. In all true scientific procedure, description and interpretation merge into each other. Any complete description is a statement of law, and the interrelations expressed by law are only enlarged and extended descriptions. Take, *e.g.*, the case of a child who is placed under unhygienic schoolroom conditions likely to develop myopia. A complete examination and description would include a synthesis of relevant conditions, fine print of text-book, distance of eye from book, blackboard, etc., together with changing bodily conditions; *e.g.*, increasing convexity of cornea or anterior surface of lens. As fast as in our analysis we exclude irrelevant terms, *e.g.*, the child's power of taste discrimination, we get a connection of relevant terms which applies beyond the immediate particular case described. If this relation really exists here it will exist elsewhere under exactly similar conditions. If such conditions are not attended by myopic development elsewhere they will not be here.

Anything like an adequate statement and defense of the dynamic theory would lead us far into the realms of psychology, logic and metaphysics, and I must refer the reader to the writings of abler critics who have dealt with the subject in detail.* In the hope, however, of making my position sufficiently clear for the purpose in hand I shall examine somewhat closely a definite example which may serve to illustrate the application of the dynamic conception to the analysis of the thought process, and the way in which educational theory, immediately pertaining to the subject of school classification, may be discovered and applied.

*I desire to express my indebtedness to Professor Dewey for assistance derived from his elaboration of this view in a course of unpublished lectures in logic at the University of Chicago.

Take, for illustration, the case of a school principal who is assigning a new pupil to a class in his school and who forms the judgment, "This is a fourth-grade pupil."

Static View.—Let us first briefly consider a purely mechanical mode of classification. The highest aim of the school principal may be to secure a certain fixed remuneration in return for certain work outlined in an agreement with a board of education. The classification of pupils is included in this work. In so far as he has considered the subject at all he thinks that children are placed in different grades because custom has so decided and because such classification saves trouble. A fourth-grade pupil is to him simply one who has gone through the first three grades, or who can pass a certain fixed entrance examination standard. This new pupil is a something to be assigned to a certain class as a botanist may assign a dead plant of a certain order to the corresponding shelf in his herbarium. It is so much child partially filled with knowledge and requiring pathological treatment in the way of more filling. The fourth grade is a place where such pupils are put through a process by which at the end of a certain fixed period they will know one third more than they did when they entered. Accordingly the pupil is given a hurried examination and forthwith "subsumed" under the fourth-grade "category" and becomes number so and so in the fourth grade.

The example is not overdrawn. I have known cases where pupils were assigned to a lower grade than that for which they were fitted, solely because there were more vacant seats in the lower grade than in the proper room.

Again, the principal may have taken a long pedagogical training and still make a static classification; *e.g.*, he may have read or heard someone say that the fourth grade should contain pupils between the ages of eleven and thirteen years and may mechanically construct the following formal syllogism:

All pupils between the ages of eleven and thirteen should be assigned to the fourth grade.

This pupil is within this age limit.

This pupil should be assigned to the fourth grade.

In this way while nominally making a rational classification he may in reality be making a most irrational one.

Dynamic View.—The fundamental difference between such static method and a dynamic method originates in the fact that any judgment in order to possess value must have arisen out of a necessity for the reconstruction of experience. There must have been a breakdown of the old and a building up of a new system. If such were not the case there would have been no interest, no attention, and the judgment would not have been made. The school principal deals with the problem proposed because its solution is necessary for the furtherance of some end which he has in view. He may, as in the foregoing static example, classify the pupil simply because he knows that he cannot receive his salary unless he performs such acts, and may care nothing in regard to how the pupil or society may be affected by the classification he makes.

The school principal who classifies on a dynamic basis also finds reconstruction of experience necessary, but he approaches the subject from an entirely different standpoint. His aim is well considered, worthy and adequate, and his interest in the problem involves the highest ethical considerations. His immediate aim may be to have his school thoroughly organized and every pupil properly occupied. The coming of the new pupil introduces an obstacle to the attainment of this end. Further, this unclassified pupil represents the point of experience where there is the greatest break, the greatest *need* of reconstruction. There may be numerous obstacles, and insight is required to select the point of greatest stress; *e.g.*, if the school fire-alarm rings at the time when the new pupil appears, and the principal proceeds to classify the pupil in

place of responding to the alarm and making the judgment, "This building is on fire!" his judgment, "This is a fourth-grade pupil," while quite correct from a static standpoint is false from a functional, dynamic standpoint because it does not meet the requirements of the case. Each situation emerges out of the one which immediately preceded it and which has broken down. At first there is a vague, undifferentiated whole of experience consisting of principal, child, school, etc. When the principal begins to realize that experience needs readjustment, that there is resistance to the habitual flow, a difficulty to be overcome, an investigation to be made, then the situation begins to become defined and to take the differentiated form of *a boy to be classified*, and *aids to classification*. The principal then adjusts himself to the problem in hand. The pupil is no longer a boy bringing a telegram, etc. He is now a boy to be classified. The principal is no longer the school principal with various duties, any of which may engage his attention. He is for the time being the classifier of this pupil.

In this defining process, however, we do not have, as the static theory assumes, on the one hand, "this boy consisting of a small isolated fragment of the universe," and, on the other hand, the formal concept of "a fourth-grade pupil" to which this fragment is to be attached. What we really have is a forward movement of experience. "The this, the here, the now," emerging problematically out of a previous situation and moving on to a solution, locate the point at which thought is to be directed and reveal the obstacle which must be overcome. It is this boy who must be classified before the school will be properly organized. Further, "the this, here, and now" represents the entire system focused. This boy to be classified is related to everything else in the universe. This classification habit which the principal brings into play is related to all previous experience.

A dynamic method of classification is based upon a principle of rational adaptation. On the one hand, there is the child—

a living, self-active personality with certain needs, desires, emotions, habits. He reacts differently to different stimuli and his development will be largely conditioned by his school environments. On the other hand, there are available various classes, teachers, etc. The purpose of classification is to place him in such a position in the system that under the changed conditions he may function at his best. It is a matter of great importance to the child and to society that he be located at the proper place. A mistake here is a mistake for life. The duty of the school principal is to make the best of the means at his command. There may be no class in his school exactly fitted to this boy's requirements, but of those at his disposal there is one which is the best fitted, and it is his business to endeavor to modify the modes of reaction already present so as to fit the requirements of this particular case. If he is bound by habit—if he can classify only such boys as he has classified in the past—he misses the characteristic features of the new situation. If he has no habits at all—if he possesses no knowledge of classification—he is helpless and can do nothing. In making the classification everything depends upon the power of insight which the school principal brings to bear upon the problem.

In our example we have, on the one hand, the presentative element—the pupil to be classified; and, on the other, the representative element—experience which will serve to facilitate this classification.

In the defining-relating, analytic-synthetic, inductive-deductive, forward movement of attention, there is a constant interaction between these two elements. The orderly system of imagery, which the experienced principal brings to bear in testing and elaborating the presentational experience, serves as a standard, a scale, a tool, in reconstruction. It enables him to determine what to select, and how far back to go in the selection. He goes far enough back to get a firm footing—a

reliable basis for future procedure. He selects according to the emergencies of the case what he deems useful and necessary. He does not endeavor to learn all about the boy, but only that which serves functionally for present classification; *e.g.*, the color of the boy's eyes may be unnoticed while his knowledge of arithmetic is carefully tested. While looking backward there is at the same time a forward look, and there are several hypotheses in the foreground of the principal's consciousness, each struggling for confirmation. From his first casual investigation he makes the inference, "This is a fourth-grade pupil," with the accompanying reservation that he should not be surprised if on investigation the pupil might turn out to belong to the third grade. He now sets to work to prove or disprove his inference.

As the trained botanist sees at a glance through a microscope certain things which a novice would never discover, and others which it would take him hours to find, so the skilled teacher, by judicious questioning quickly gains a knowledge of the conditions of the case. The reconstructive mental material furnished by experience enabled him to exercise prophetic vision. As on the lower planes the kinoesthetic image forms the "mental cue" to the motor act, so here there is the anticipation of the result, an idea of how this boy would react to the conditions if placed in a fourth grade. And thus under ordinary conditions the school principal can make the adjustment without danger of error.

The problem of classification may, however, become very complicated in actual experience; *e.g.*, the pupil may be above the reading standard of the fourth grade and below the arithmetic standard of the third grade and the parent may be very anxious to have the pupil assigned to the highest possible grade. In such cases the principal often refrains from issuing his "fiat" without further experimentation. He postpones the decision and puts the pupil into the

crucible of actual grade experience. He knows that a pupil tested in a higher grade and then consigned to a lower is likely to fail from discouragement and he therefore makes the test in the third grade, it being distinctly understood that the arrangement is simply tentative. In this way a more definite and satisfactory reaction is secured and usually in the course of a day or two the matter is settled beyond a shadow of doubt. Then, and not till then, the principal completes the judgment, "This is a fourth-grade pupil."

Now, the difference between the static and dynamic modes of classification is not a temporal one. The classification may be made more quickly in the latter case than in the former, for the principal knows exactly how to proceed. The difference is one of function, attitude, insight. The claim made in this thesis is that the dynamic method of classification is scientific and the static unscientific, and, further, that whatever has been or can be discovered which will aid the principal in making such dynamic classification may properly be said to be included in the science of education. Such assistance may be gained from a judicious study of many subjects—ethics, sociology, psychology, history of education, school organization, etc.

There are different stages in the development of child life. There are subjects of study, ways of presenting them, and kinds of surroundings—physical, social, ethical, æsthetic—which at these respective stages are especially adapted to the highest educational advance of the learner. These relations have been pretty systematically worked out in detail so that now there is, as we shall see later, an organized body of scientific knowledge on the various lines suggested at the disposal of anyone who will take the trouble to refer to it. This general educational theory has been studied in its application to the special problem of classification. It has been brought to educational consciousness that the proper time to promote

a boy may not be when the whole class or a majority of the class are ready, but when he has reached the promotion point. It has been realized, further, that age, initiative power, health and other elements should be taken into consideration and that a knowledge requirement by itself is not always a sufficient criterion for classification.

It must not be forgotten, however, that such residual knowledge concerning classification of pupils cannot be used in its primal form. Its only value is to afford insight into the problem, and to be most helpful it must be assimilated. The school principal must have thought it out. He must have experimented sufficiently to have made the facts his own, and to be able to sympathize with, *i.e.*, to put himself in the place of, the pupil, and consider the situation from the pupil's standpoint. In addition to such theoretical knowledge he should be familiar with the materials which are at his disposal. The number of grades in the school, the maximum and minimum qualifications of the pupils in respective grades, the nature of the work being done, the characteristic powers of different teachers—a familiarity with these and many other details will prove of value.

We have thus far considered the school principal as taking an interest in this case because it presents an obstacle in his experience requiring reconstruction. In order to obtain his ends this pupil is to be classified and he solves the problem as a matter of economy and utility. But he may have a scientific interest in the case—in its bearing upon educational system, in its power to furnish an instrument for future classification. This phase reveals a different attitude on the part of the observer.

Scientific treatment originates in the proof process. The problem becomes more and more complex and, as in the foregoing example, we start in to prove, or disprove, an inference made. The process of reconstruction may become

so extended, may require so much development and elaboration, that we become interested in the *development of the technique*, and, for the time being, the practical phase is submerged. Instead of being interested in proof we are now interested in getting a technique for suggesting and solving problems. The mind assumes a distinctly experimental and reflective attitude, like that of the physical scientist in a laboratory investigation. We proceed to develop and to test hypotheses. We create artificial conditions for experimentation. We exercise the greatest possible care in observation, interpretation, elaboration and statement. Thus we arrive at law.

I hope to show in subsequent chapters that it is possible to formulate laws of educational science in this way, and that a large body of such results have been reached scientifically. My contention is, however, that these laws are of especial value, not as possessing finality in themselves, but as abstractions made for purposes of control of the educational process.

CHAPTER IV.

THE DYNAMIC CONCEPTION OF EDUCATION.

THE definitions and systems of education proposed from time to time have been reflections of the philosophical views held implicitly or explicitly by those who have been instrumental in their construction.

1. *The Information Theory.*—The extreme, dualistic conception which posited ultimate reality as external to the individual, whether it took the form of Plato's *Eidos* (which was supersensuous but nevertheless external), or that of the measured, spatial object of the materialist, issued in an educational theory that considered the individual a receptacle to be filled with static knowledge concerning external types or objects, and made information the prime, if not the sole, factor in education.

2. *The Development Theory.*—At the other pole of this dualistic view we find the subjective, idealistic conception that "mind makes nature," from which was developed an educational theory of spontaneity expressed by the words:

> "There is an inmost center in us all
> Where truth abides in fullness, * * *
> * * * * * and to know
> Rather consists in opening out a way
> Whence the imprisoned splendor may escape
> Than in effecting entry for a light
> Supposed to be without."

In accordance with the most extreme conception of this theory, an effort was made to have the child spin the universe out of his own inner consciousness.

The information method proved inadequate because it presented to the mind material without regard to its suitability and without attention to its assimilation. The development view failed because it furnished no proper content for the mind to work upon and spent time in

> "Dipping buckets into empty wells
> And growing old in drawing nothing out."

3. *The Follow-Nature Theory.*—From this double failure emerged a third view closely resembling the development theory but reflecting (though imperfectly) two important advances in modern thought, viz.: a reaction against the static, dualistic philosophy and an increased appreciation of the results of natural science investigation. This third view in its extreme form may be summarized as follows: The advocates of the information and development methods have made a mistake in divorcing mind from matter; "intuitions without concepts are blind, and concepts without intuitions are empty;" accordingly both the physical and psychical phases must be considered in education. The information theory is right in holding that there are important facts outside the child which must be learned. The development theory is right in holding that all education must be self-education. Both are wrong in establishing an artificial method which has interfered with the process of natural development. They have made the child self-conscious—like the centiped that got along well enough until he began to count his legs, when he became bewildered and fell into the ditch. We must follow nature. On the biological and psychical sides "the genesis of knowledge in the race conforms to the genesis of knowledge in the individual." Do not interfere with the child's development. Let him discover everything for himself and abide by the discipline of consequences. If he puts his finger into the fire and is burned he will not put his finger into the fire the next time. He cannot learn to swim without

going into the water. Let him alone and when the proper time comes he will go in of his own accord and develop his own individual method, imitating as much as is necessary. An instructor does more harm than good. The result of instruction in swimming is to render the child artificial, constrained, mechanical, self-conscious, and eventually to spoil what would otherwise have been a good swimmer.

Now, this is a very insidious argument and one which in a more or less modified form has made a host of converts, including many eminent men. Its fallacies have been frequently exposed, but it dies hard because it is based in part upon a dynamic conception which when properly understood and applied is the most vitalizing principle of all activity.

Let us consider for a moment the origin of the true conception which this theory has only in part understood. Perhaps Hegel's greatest contribution to philosophy was that he developed the view that "being" and "non-being" are one and their common term is "becoming."* He says (*Hegel*, I. 385), "The infinite expansion of nature, and absolute retraction of the ego upon itself, are fundamentally identical, yet, both being equally real, spirit is higher than nature. For though in nature we have the realization—the infinitely-diversified mediation of the absolute—yet spirit, as being essentially self-conscious, when it draws back the universe into itself as it does in knowledge, at once includes in itself the outward, expanding totality of this manifold world, and at the same time overreaches and idealizes it, taking away its externality to itself and to the mind, and reflecting it all into the unity of thought."

This attitude, reinforced by recent developments of physical and biological science, has powerfully affected the trend of all modern thought. Its tendency has been to substitute concrete relationships for absolute rights, reciprocity for independence, and evolution for revolution. In its best form it has striven

*See *Hegel-Caird*, p. 163.

to conserve all that was good and beautiful and true in the past and to enrich the inherited material by transferring and adapting it to present requirements in such a way as to work for the general enlargement of human interests and privileges.

The great defects in the "follow-nature" theory of education are that it ignores this heritage of the race and forgets the true aim of education and the means to the attainment of that end.

4. *The Dynamic Conception.*—The conception of education advocated in the following pages means evolution, but evolution hastened and directed by reason. As we shall see, the purpose of education is to socialize the child, to enable him to gain power to help himself and others. In order to do this he must learn to reconstruct his experience in the easiest and best way. On the knowledge side instead of following the slow, natural process of discovery pursued by the primitive savage he must cross-section the advance movement and in a few years pass over a course to a position which it has taken thousands of years and numerous stages of civilization to reach. It is neither possible nor desirable that he should know all that has been or can be learned. There must be judicious selection. Nor is this selected knowledge a body of fact to be taken on as a dead burden by the learner. It is a something which has existed in the consciousness of others and must be translated into his consciousness as power for future achievement. Nor is it always to be learned in the *order* in which it was discovered by the race. The child should not be permitted to follow every fickle and transitory interest but only those interests which he would possess if he were fully conscious of the most vital needs of the present situation. It is in this abbreviating, translating process that the teacher participates as "guide, philosopher and friend" to aid in the proper preparation of mind and in the proper selection and presentation of material. Society provides both school and teacher, in order that the individual may realize

the highest purpose of education in the most rapid and thorough-going way.

It may not be out of place to remark in passing that the "follow-nature" theory is often urged as an argument against the professional training of teachers. We are told that the only way to learn to teach is by teaching, that if one is a born teacher he will succeed, and if not he must take the consequences. This is the argument, in a new dress, formerly urged in favor of the quack-herb doctor as against the trained physician. Its advocates overlook the fact that the theory pressed to its ultimate conclusion entirely does away with the necessity for any teacher.

If such control, abbreviation of labor and translation of knowledge as we have referred to, be entirely unnecessary then the child requires neither school nor teacher. "Follow nature" means either that civilization has left us nothing that is worth learning or else that a teacher can be of no service in facilitating the process of mastering it. Similarly, those who advocate that the only way to learn to teach is by teaching must mean either that thus far nothing of value has been discovered regarding teaching, or that what has been discovered cannot be learned in any other way than by rediscovering it in the original primitive fashion. Their position further asserts that beginners have the right to practice upon children, and that it is the duty of parents and public to allow children to be made the suffering "stepping-stones" on which the would-be teacher is to "rise to higher things."

Much has been said and written concerning the injury to children resulting from child-study experiments and from the teaching of pupil-teachers in training-schools. But in most schools these evils have now been reduced to a minimum or entirely overcome. Child study can be carried on most effectively without the child being conscious that he is being studied, and a pupil-teacher may prepare a lesson so thoroughly and teach it so well that the results are quite as satisfactory as

those secured by the regular teacher. On the other hand, one seldom hears a word of protest against that most protracted, and dangerous kind of child study and unscientific experiment which is inflicted upon children when the untrained novice without any special preparation for teaching—without even the appreciation of a necessity for such preparation—and with no critic to notice errors or suggest improvements, plunges in haphazard and blunders along year after year getting (so-called) "experience."

The problem of education does not admit of so easy a solution as to enable the teacher to be quite sure that he will not make shipwreck if he simply trusts to blind enthusiasm and instinctive sympathy without taking the trouble to inquire what port he sails for or the best route by which to reach his destination.

To return to the subject of our former discussion, if, instead of adopting "information," "development," "follow-nature," or any other of the many educational shibboleths which have been proposed from time to time, we carefully investigate the subject from the functional standpoint we shall see that each of these views is narrow and segmental.

In considering the aim and method of education we must take a wider outlook. True education is both instruction and development. It is natural and artificial. It concerns the individual in his totality—physical, mental, social, spiritual, religious. It is for the present and for the future, for mastery and for service, for the individual and for society. It involves the self-activity, the self-realization of the learner, the guarding and controlling influence and inspiration of parent and teacher, and the assistance of the community and the state. It is not one but all in proper equipoise. These characteristics are not isolated, static, unrelated entities. They are simply different factors in education, angles from which the process of the reconstruction of educational experience may be viewed. They

all enter into the totality of a harmonious educational system and find their center in the remaking of present experience.

In the laudable desire to make of education a preparation for the duties and responsibilities of adult life there has been a tendency to shift the focus of attention upon the future to the neglect of the present, and to forget that we are not gifted with such prophetic vision as to be able to forecast with any degree of certainty the conditions under which the child is going to be placed in adult life, and, further, that, in any event, the best way to prepare for the future is to live the present life in the best way. The result of ignoring this fact has been to rob the child of the gratification of present achievement and to render him unnatural and unpractical. The focus of the universe and of life for the individual is the present situation. What is done in education must be done at this point in the reconstruction of special experience under special conditions of adaptation. The starting point and the instruments are found here, and the criterion of value of any educational instrument is its adequacy in the facilitation of this present reconstruction. In other words, education is "the life to be lived."

For purposes of clearness I shall now state my fundamental position dogmatically and endeavor to substantiate it at a later stage.

If we take the case of any individual learner and define the situation "the this, the here, the now" to the very last inch, *e.g.*, boy, teacher, schoolroom conditions, time of day, etc., then from the very nature of things the following statements will hold true in every case without exception:

1. *Individual Characteristics.*—This learner possesses certain tendencies, habits, capacities, adaptations, interests, which are different from those of any other child and different from those which he himself has previously had or will subsequently possess.

2. *Aim.*—There are certain educational aims which for him are preferable to any others; *e.g.*, development of character,

including knowledge and control, is a superior aim to that of the accumulation of wealth for the sole purpose of sensuous gratification.

3. *Means.*—There are available certain educational means which, both as to content and form, are for his particular conditions best fitted for the attainment of this highest ideal.

4. *Material*—(*a*) *Subject-Matter of Study.*—There is a certain kind of stimulus to the learning activity which is superior to any other content which could be selected. As shown in Chapter III this stimulus presents a problem for solution, an obstacle to the habitual flow, a something which renders reconstructive thought necessary. The subject-matter is not to be chosen at random. There are certain forms of study which would be injurious to the child and subversive of the true aim of education—*e.g.*, the most successful methods of picking pockets; there are others which would be comparatively valueless—*e.g.*, the names of certain unimportant islands in a distant ocean; there are still others which might be very valuable to another child, but not to this child, and so on. In other words, there is some particular form of reconstruction, be it a problem in algebra, the consideration of a literary selection, the making of a thermometer or some other form of definite activity, which for this child here and now is preferable to any other which could be presented.

(*b*) *Conditions of Study.*—The surroundings of the learner, his companions, the hygienic conditions, schoolroom furnishings, etc., influence his development in large measure; *e.g.*, a temperature of sixty-five degrees may be preferable to one of sixty degrees, a male teacher may be preferable to a female teacher, or vice versa. There are forms of such external conditions under which the child may be placed which for this particular child at this period are superior to any others, and unless the best available surroundings are secured his education is interfered with.

5. *Methods.*—There are certain methods of teaching and learning which for this child are preferable to any other. There is a best form of presenting the material as regards quality, quantity and sequence, and a best form of mind reaction upon this material when presented; *e.g.*, mathematics may be the best study for this hour, but manual training may be preferable to mathematics for the next hour. At some future time percentage may be the best subject, but to-day the stage of advancement may be such that addition of fractions should occupy the attention. It may be better at some other time simply to tell the child the fact to be learned or to let him discover it without any external aid. At this time, however, the best thing to do may be to suggest and develop through sequential presentation of material, and through a form of questioning which will direct the focus of attention upon greatest difficulties in such a way as to lead to rapid solution. In this lesson it may be best to emphasize certain points which in themselves are comparatively unimportant but which prepare the mind to react upon material to be presented in the future. On another occasion it may be better to emphasize the main fact to the exclusion of all others. Again, the physical and mental condition of the pupil may be such that sleep is preferable to any kind of activity.

The criterion of excellence of subject-matter, external aid or method, is always its functional aptitude in furnishing that kind of problem best fitted to the present powers of the child and to the true aim of education.

By the term *available* (p. 41) I mean within the possibilities of the case; *e.g.*, it may be true that at this stage in the boy's career expensive travel would be more valuable than school study, but if the travel-scheme is entirely impracticable it need not enter into our consideration. The best available conditions for a boy in a class of fifty pupils are very different from those for the same pupil in a class of thirty. The teacher who would avoid discouragement does well to remem-

ber that there can never be responsibility unless there is corresponding power; in other words, "if we ought we can."

As has been pointed out the individual never remains the same for any appreciable period of time. In the forward movement of experience the shifting of the focus of the present reveals constant change, constant growth. There is a continual breaking down of the old and a building up of the new under conditions which render education possible. The very essence of education is to see that at every step of the process this reconstruction is effected in the best possible way for the individual and for society. The form and value of the reconstruction at every point is conditioned upon the aim selected and the means adopted for its attainment.

Educational science arose from an effort to gain control of the educational process, to secure instruments of insight which would enable the educator to make the wisest selection of aims and means. I shall endeavor to establish not only that the construction of such a science is possible, but also that it has been in a measure realized, that there exists a body of tested and systematized knowledge which properly falls under the category of educational science, and which when properly apprehended and applied is of genuine assistance to the teacher.

It is not claimed that there have been, or can be, discovered educational facts or laws which when memorized will enable the teacher to posit with certainty the best method of procedure in each particular case. The contention is that by following a certain course of preparatory investigation the teacher will gain such insight as will enable him to understand the particular situation in its complex bearings—its needs and the proper mode of response—in a way that would have been entirely impossible without such preliminary training.

I shall next proceed to a closer analysis of the aims and means of education.

CHAPTER V.

EDUCATIONAL AIMS AND MEANS.

No clearly-defined differentiation can be made respecting the true aims of education and the means to their attainment, and any analysis must, in the nature of the case, be abstract, static and artificial. However, for purposes of clearness in our discussion, the following may be of service:

EDUCATION:

I. *Its Aims:* {Knowledge / Discipline} attitude, control, culture, character.

II. *Its Means:*

A. Material or Instruments:

1. The self-active individual to be educated.
2. The surroundings of the individual:
   - (*a*) The subject-matter of study, as literature, art, science.
   - (*b*) The social factor, as parent, teacher, companions.
   - (*c*) Direct stimulus to the learning activity; *e.g.*—in the study of a mountain in geography—an actual mountain or the artificial material, sand molding-board, etc., by means of which the definition of a mountain may be illustrated.
   - (*d*) Physical conditions which render education possible; *e.g.*, food, air, etc.

B. Methods or Form:

1. The selection and arrangement of material, *i.e.*, the proper presentation of problems.
2. The securing of proper conditions for study.
3. The proper direction of the learner's activity upon the material presented.

We have seen that the function of educational science is to furnish an insight regarding the highest educational aims and the most effective means to their attainment. Let us now proceed to a consideration of the basis upon which these aims and means are formulated.

I. Educational Aims.—The school is a social institution which owes its origin and maintenance to the belief that it is for the good of the state and of the individual that the child should be educated. As Doctor Dewey says, "The purpose of education is to socialize the child." The curriculum, the methods of study, the entire school machinery, will, therefore, be determined by the views held regarding the most perfect type of socialized individual.

Any narrow static view which makes the *summum bonum* consist in formal discipline, unassimilated information, or superficial polish, falls far short of the true ideal.

What the child needs in order to make him a valuable factor in present and future social life is a complete mastery of himself, a power and willingness always to choose the particular line of conduct that shall most highly develop his own personality and yet be most completely compatible with the best interests of others. In other words, what he needs is *character*.

At the outset he is comparatively helpless and at the mercy of his surroundings. His activities are instinctive or impulsive. His aims are of the vaguest sort, and his selections of a reflex type, resembling those of the plant and lower animal in their adaptations for survival. He is absorbed in the present.

He soon begins, however, to develop self-consciousness. He sets up ends or aims and goes about realizing them. He gains control of his own organism. He forms habits which leave him free for more deliberate action and for the formation of more remote and comprehensive ends. He advances from physical and prudential to moral control. He identifies himself with those about him, cultivates feelings of love and sympathy and forms ideas of his rights and obligations as a member of society. He reflects on his duties to family, fellowmen, country and God. With this upward development of freedom, these more comprehensive ends become laws. These laws, though sometimes apparently conflicting, may be generalized into a permanent principle of conformity to highest law. Finally, this principle of conformity to highest law forms a criterion for all impulses and desires, and the individual "finds his moral good in conformity to the ideal standard set up by the reason and willed by the reason" (Watson's *Hedonistic Theories*, p. 136). Thus the individual attains character.

Character in this sense means culture, but a culture which combines both knowledge and discipline. If knowledge is ignored the experience lacks in adequate content for further adaptation. If discipline receives no attention the information is not translated into a system but remains unrelated and proves a dead weight in future advance.

True knowledge means increase of power of interpretation. As a result of the assimilation of intellectual and moral food from the social storehouse the individual sees everything in a new light. All activity takes on a fuller and wider meaning. True discipline, on the other hand, resulting from scientific, orderly, systematic procedure, gives to the content a proper form of adaptation in relation to social requirement. Culture or character, then, rightly understood is the whole individual thus socialized whose productive powers have been so con-

trolled and enriched that his activity now possesses explicit social value.

Any narrow aim in educational procedure is apt to develop into a passive, individual, caste selfishness. Scholarly attainment, skill, refinement of manner, are then sought, not for the true end of education but for purposes of self-aggrandizement and exclusive privilege. The dynamic view, on the contrary, is based upon a principle of coöperation. It holds that without the advantages of contact, both with society and with its resources, there can be no education worthy of the name. The individual who is truly cultured rises into social consciousness, realizes that he is a member of society, embodying in himself the attainments of civilization, and that he is a social instrument in the perpetuation and improvement of these attainments. He brings to society certain individual capacities. Society furnishes aims and means for the transformation of these activities so as to give them social value.

This does not imply that there is a something called society which exists apart from the individuals composing it, nor that the individual loses his identity and becomes swallowed up in society. It simply means that he becomes functionally an organic element in the larger diversified whole which reacts again upon his individual experience, rendering individual unity richer and more complete.

An individual of good character, then, possesses good judgment—a keen sense of discriminative insight which sees things in proper perspective and proportion. He is conscious of the respective worths of elements and is able to select the important and abiding factors. He is more, however, than a cold logic engine; he possesses a sensitiveness which "feels a stain as a wound," an emotional delicacy or responsiveness to certain elements of worth which cannot be mathematically measured. Finally, he possesses force of character. He is able to arrest the onward flow, to examine the situation, to

decide in conformity with his convictions and aims, and, when obstacles or temptations arise, to persist in the execution of his choice.

The Ethical Factor.—In practical experience the educator is always met with a concrete situation and the question is what ought to be done next. This question cannot be properly answered without careful reflection, nor can it be disposed of by dogmatic rule. If, as has been said, education "is the life to be lived," the most vital of all questions is what kind of life should be lived, what is the ideal type of life. The educator must be able to go farther than a mechanical application of a fixed ethical standard. He must have the insight to cross-section the present experience and to investigate this situation and determine what under these conditions ought to be done. Such insight can be gained only by a careful and extended examination of the educational problem in its religious, moral and sociological relations. A professional training course for teachers should afford opportunity for such examination and for access to the best literature on the subject.*

II. Educational Means.—When we proceed further, and ask to what extent and in what ways the educational process is to be facilitated through an insight furnished by educational science regarding the means of attaining these ends, we are again faced with a complicated problem.

A. MATERIALS.—As we investigate the various details suggested in our table we find that in a certain sense the materials or instruments to be used are furnished ready to hand by forces over which the educator can exert no direct control.

* See *Aristotle's Nichomachean Ethics*, Peters.
Christianity and Idealism, Watson.
The Study of Ethics, Dewey.
Prolegomena to Ethics, Green.
Plato's Theaetetus, Dyde.
Froebel's Educational Laws, Hughes.
Herbart and the Herbartians, De Garmo.

The individual learner is born into the world with certain physical, intellectual and moral potentialities, with instinctive impulses, aptitudes, tendencies, which will always condition his educational advance. Nor are his native surroundings more subservient or less important. His social relations are in great measure unchangeable. The wealth of his inheritance in the realms of literature, art and science cannot be augmented by any direct educational fiat, but slowly increases as a result of the perseverance and sagacity of the race. His physical environment, as regards stimulus to the learning activity, and the conditions under which such stimulus is received, appears to be beyond the pale of educational influence.

And yet in regard to each of these details educational science has indirectly an important work to perform. It emphasizes the advantages to be gained by a proper start in education; *e.g.*, it finds on the negative side that the child born with weak physical or mental powers, in an uncivilized community, under conditions of extreme poverty, is by each of these circumstances seriously handicapped in the educational race. It endeavors to determine the ideal types of individual and of surroundings best fitted for the attainment of the most satisfactory results in the educational process and is, therefore, deeply interested in the investigation of ways and means for the proper production of such types.

The educational science of the future will, no doubt, pay much greater attention than is at present paid to the consideration of prenatal problems and to such adjustment of wealth conditions as shall render it possible to give to every child a liberal education. Such investigation is biological, sociological and political in character, the psychology involved in it being rather sociological than individual. When treated from the educational standpoint the results of such investigation may fairly be included under the head of educational science, and should form a part of every teacher's training course.

B. METHODS.—Let us now proceed to a consideration of the *methods* by which these *materials* can be best utilized in education in order to attain the highest aims in the most rapid and thorough-going manner. This, after all, is the practical problem of education—the one with which the teacher has primarily to do, for usually the learner and his surroundings are existing conditions and the teacher has to make the best of them.

I shall endeavor to establish that in this most important and direct phase of the teacher's work the greatest aid is furnished by a study of psychology and the cognate sciences of biology, neurology and physiology, and by a study of the history of education.

1. *The Psychological Factor.*—As a preliminary step it may be wise to clear the ground by a brief consideration of certain misconceptions which have tended to create a reaction against psychology as an aid in the preparation of teachers.

1st. It is sometimes urged that there are few, if any, psychological facts upon which psychologists are themselves agreed and that, therefore, no assistance can be derived from psychology.

Now, this objection arises from a misapprehension of the actual conditions. It is true that since the opening of the first experimental laboratory in psychology by Professor Wundt at Leipsic, in 1878, very great changes have taken place in methods of conducting psychological study and great advances have been made along certain lines of psychological investigation.

With this rapid development new discoveries and controverted opinions have attracted public attention to such an extent that established facts have been in a sense forgotten. An investigation will show that there is a large body of psychological knowledge upon which all are in substantial agreement and much of this knowledge is of the greatest

value in education; *e.g.*, the principle that "concentration of attention is an aid to memory" is one which has been universally admitted and practically applied from the earliest times. The modern psychological movement has verified the statement by scientific experiment, has given us a better insight into the true meaning of concentration, attention, and memory, and has thus rendered the principle a more valuable educational instrument than formerly. Thousands of similar examples might be quoted where there has never been disagreement regarding the fundamental facts.

When we examine the field of controverted theory we find that psychological science is building upon sure foundations and, further, that those factors which in their nature would be of most value to education are those concerning which there is little or no difference of opinion.

The example usually quoted in substantiation of the objection is that of the many different-color theories held by Wundt, Hering, Young, Helmholtz, etc. It is pointed out that leading psychologists devote much space to the views of the rival claimants, and that almost every psychologist has a theory of his own.*

Now, the "color theories" referred to as controversial are attempts, which thus far have proved only partially successful, to conceive a process in the retina which could be correlated with the facts of consciousness. In other words, each color theory proposes an answer to the question, "What chemical or mechanical processes take place in the eye—more specifically in the retina—when I see, or have sensations of, light and color?" Obviously the correct reply to this question must be in harmony with the facts of color sensation—*e.g.*, the phenomena of color mixture, color contrast, after images, and color blindness.

There is still considerable difference of opinion as to what are the actual facts, but the points in dispute are being con-

*See *Outlines of Psychology*, Külpe, p. 136.

stantly narrowed down through scientific research, and as a result some color theories have been entirely discredited and others greatly modified. While the discovery of a theory of visual sensations which would explain all the phenomena upon a psycho-physical basis would be of great interest to the educator, and might ultimately prove of much value, it is rather with the facts regarding color phenomena that education is most deeply concerned, and more particularly with that large body of facts which are now universally agreed upon.

For example, as regards color blindness of pupils the advantages accruing from the possession of psychological knowledge by the teacher would be the following:

(*a*) Such knowledge would aid in determining whether color blindness is sufficiently important to enter into the problem of control of the learning process. There are conceivable cases —for instance, that of studying a colored map in geography— where the color-blind pupil might be unable to understand presented material and would thus be placed at a disadvantage. After an investigation of such cases the question would be, Is the abnormality of sufficient importance and frequency and is its remedy sufficiently practicable to render it wise to spend time in considering particular cases?

(*b*) It would aid in determining what are the phenomena of the abnormal condition and how the defect may be discovered. Here such facts as that color-blind children are usually very sensitive in regard to the defect, that they are likely to make certain kinds of color errors, and that the sorting of yarns is probably the most satisfactory test of color-blindness, would be aids to the location of the difficulty.

(*c*) It would aid, by furnishing answers to such questions as the following, in determining by what means the abnormal conditions could be overcome: Is there any mechanical device which if adopted would overcome the difficulty as spectacles

do in cases of myopia?* Is there any corrective form of muscular exercise? Is there another available avenue of approach, by means of adaptation of present partial-color sensations or through visual or auditory channels or verbal explanation?

Now, there is scarcely any difference of opinion regarding the results of investigation along any of these three lines of inquiry.

2nd. Another popular conception which has tended to prevent psychology from being used as an aid in teaching finds expression in the opinion that there is no relation between psychology and education.

(*a*) This objection may arise from an incorrect view of the scope of psychology, an objection which vanishes when we consider what psychology really is.

A recent writer of high authority says (Stout, *Manual of Psychology*, p. 12), "Since the whole world, as it exists for an individual consciousness, whether from a practical, theoretical, or æsthetic point of view, has come so to exist through prior mental process, it may be said that there is no objective fact which is not capable of being utilized by the psychologist. From this point of view we may say, with Dr. Ward, that 'the whole choir of heaven and furniture of earth' so far as they are known are data for psychology (article 'Psychology,' *Encyclopædia Britannica*, 9th ed., Vol. XX, p. 38). So, too, are all works of imagination; *e.g.*, the *Iliad*, or *Hamlet*, or Grimm's *Fairy Tales;* and all rules of conduct; *e.g.*, Roman law, the Brahman ritual, the four books of Confucius and Mencius. We must, however, carefully note that mere examination of mental products is valueless for psychology, except in so far as it helps us to trace mental process."

Now, the ability to "trace mental process" is a necessity for the proper selection and presentation of material and the

*See article by Professor Kirschman, *University of Toronto Studies*, Psychological Series No. 1.

proper direction of the learner's activity, and, therefore, if Professor Stout's view be correct, psychological study is necessary for the teacher; *e.g.*, regarding foreign-language teaching Professor Findlay says (*Report of Educational Subjects*, London, England, '98, Vol. II, p. 353), "If it were possible for teachers of foreign languages to come to some agreement as to the essential nature of a native language, of a second language, and of the processes by which these grow in the mind, we should not be far from an agreement as to their place in the curriculum, and as to methods for teaching them."

I hope to show somewhat definitely in the next chapter how in such selection and presentation of material psychology is of genuine assistance to the educator.

(*b*) Again, in contrast with this too narrow view of the scope of psychology the objection may arise from the other pole and may be due to a reaction against exaggerated claims for psychology in education, for with some "educational science" and "psychology" are synonymous terms.

It is important to remember that psychology in this connection has its limitations as well as its possibilities. (1) A training in psychology as an aid to the teacher can never take the place of scholarship, aptitude or practical experience. While conceding this point it should not be forgotten that psychological study *per se* possesses a culture value not to be despised, and many teachers have also found that through its study—especially in the branch of child study—they have been awakened to an interest in, and a sympathy with, children which they would not otherwise have possessed. Further, the value of experience in teaching is greatly enhanced by the power to appreciate the salient points of such experience—a power which is greatly increased by psychological study. (2) Psychology does not furnish fixed and inexorable laws which may be applied to all schoolroom cases. It furnishes instruments of insight which must be ration-

ally adapted to the needs of each new situation. (3) All of psychological science is not of direct educational value. Much of what is properly included in a university course in psychology is scarcely of more value to the teacher than to the mathematician or to the civil engineer. (4) Education is not a subdepartment of psychology. To be of most service in education the psychological facts must be considered from the educational standpoint. While education owes much to psychology, some of the most fruitful fields of psychological research owe their discovery to suggestions originating in educational investigation. Thus education and psychology reinforce each other. (5) Psychology, as we have seen, does not cover the whole ground of the aims and means of education. It does not tell *why* we study, except in a selective sense, or *what* to study, but it aids us materially in determining *how* to study.

2. *The Historical Factor.*—A study of the history of civilization, and more particularly of that phase termed "the history of education," is of the greatest assistance in the solution of educational problems and thus furnishes valuable contribution to educational science. This involves not only a study of educational aims and means adopted in the past, and of the successes and failures which have attended certain lines of action, but also an investigation of what is now being done, of the best systems of education, courses of study, text-books, and methods of school organization, management and teaching, at present obtaining in various countries of the world. Such empirical investigation serves to guard against error, to suggest lines of improvement and to act as a balance-wheel to the abstract and ofttimes impracticable theories elaborated from the philosophical side. Thus by a minimum of effort we may avail ourselves of the results of the costly experimentation of many generations.

The teacher in training finds in past failures, such as that of the monitorial-system experiment, in the wise counsels of such

educators as Comenius, in the examples of the vigorous personality of such leaders as Arnold, and of the self-sacrifice of such philanthropists as Pestalozzi, a safeguard against error, a guide to sound method and a stimulus to future endeavor. Further, a comparative study of educational systems, past and present, reveals an irreducible minimum of scientific, educational instrument which has stood the test of years of experience, which is in accord with the sanest educational theory, is almost universally agreed upon, and which, being accepted, leaves the student free for the investigation of other problems which demand attention.

The space at my disposal does not admit of a detailed statement of the ways in which all the subjects referred to in this chapter—ethics, sociology, etc.—contribute to educational science. For purposes of illustration, however, I shall select one of these subjects and shall devote the next chapter to an analysis—somewhat in detail but still necessarily very incomplete—of ways in which psychology is of service to education.

CHAPTER VI.

THE PSYCHOLOGICAL FACTOR OF EDUCATIONAL SCIENCE.

ADOPTING the view that psychology enables us to "trace mental process" let us next proceed to a consideration of various modes in which, when viewed from the educational standpoint, psychology does this in such ways as to furnish assistance in the solution of educational problems.*

It may be noted at the outset that if there were no development of mental process, and no related sequence in such development, there could be no education worthy of the name. The child furnishes the starting-point and the focus of educational activity, while his capacity for improvement, and the length of time during which the learning activity may be continued, condition the entire process.

As has been pointed out by Fiske, Harris and others, the possibility of education, and, therefore, of the advance of civilization, varies directly as the length of the period of infancy. In the lower animal born with fixed instincts there is but a brief period of advance. The child of the savage, and the gamin of the street, evince remarkable precocity along certain lines, but they mature at an early period and in later life suffer from the results of arrested development. On the biological side it takes months or even years for man to form coördinations which in the case of lower forms of animal life are practically present at birth. Hence, with the child there is dependence upon society, calling forth such moral virtues

* See *Applied Psychology*, McLellan.
The Psychological Foundations of Education, Harris.
Psychology in the Schoolroom, Dexter and Garlick.

as pity, sympathy and self-sacrifice. There is also an almost limitless capacity for progress in forming numerous and complex combinations of original activities. Further, there is with the child in civilized society a tendency to take on the attitude or spirit of his surroundings; *e.g.*, the child who has been reared in a home of culture and intelligence speaks the language and in a great measure thinks the thoughts of those with whom he has come in contact. It is owing to these characteristics that education becomes possible and necessary. Through the last mentioned, viz., the capacity of adaptation to environment, society finds a key to the solution of the educational problem.

I. The Stages of Mental Development.—Psychology furnishes a knowledge, more or less complete, of the stages of mental growth from infancy to adult life, and so provides a standard and criterion for discovering what subject-matter is necessary and appropriate to a given phase of development—necessary to answer to the hunger that is there, and appropriate to contribute to the possibilities of growth.

The most casual observer of child nature has not failed to notice that while there is great diversity in development there are certain clearly-defined resemblances common to all; *e.g.*, no one would suppose that a child three years of age could comprehend the calculus or fully appreciate the beauty and power of Raphael's "Transfiguration;" nor would anyone expect to find marked differences in the ability or temperament of the same child on two succeeding days. Shakespeare, whose insight into the working of the mind was so clear that he is said to have "dipped his pen in the human heart," has left us in his "Seven Ages of Man" a graphic and accurate description of the most prominent periods in the cycle of life. Professor Donaldson (*Growth of Brain*, p. 46) makes the following postnatal subdivision from the biological standpoint: "Infancy, the period of dependence

upon the mother (in medical jurisprudence extending to the time when the milk teeth begin to be shed); childhood, from the beginning of independence to the age of puberty; youth, from puberty to the completion of the increase in both stature and weight; maturity, from the completion of growth to the onset of uncompensated decay; old age, from the beginning of uncompensated decay to death."

The educative period is confined mainly to the first three of these divisions. School life presents two prominent budding periods or points of departure, viz., (1) the conclusion of later infancy, from the sixth to the seventh year, when the brain has attained almost its full weight, and (2) the conclusion of childhood and beginning of adolescence from the twelfth to the fourteenth year (earlier with girls than boys).

Speaking generally, in earlier infancy the activity of the child is directed mainly to gaining a mastery of the fundamental bodily organs. In later infancy, during the kindergarten, symbolic or play period, he utilizes his sensation images as ordered cues or signals for motor expression in play in which the interest lies wholly within the activity itself. During the period of childhood the response to stimulus is postponed for some time and action begins to be controlled by the idea of a result or product, instead of following the interest of immediate expression in play. In the period of youth the mind takes on a more reflective or scientific attitude and there comes a more thoughtful adjustment to larger social relations of the individual.*

II. The Unity of Individual Experience. — Psychological investigation of the educational process discovers not only that there is a regular succession of attitudes toward life

* See *Pedagogical Seminary*, E. Stanley Hall.
Psychology of Childhood (5th ed.), Tracy.
Studies in Education, Earl Barnes.
Mental Development in the Child, Preyer.
Studies of Childhood, Sully.
Mental Development in the Child and the Race, Baldwin.

and experience, which attitudes reveal themselves in the child at certain fairly-well-defined periods, but also that there is an underlying *unity* which gives coherence and identity to all experience.

At each stage we find an inseparable connection between mind and body. Every conscious experience exhibits a threefold aspect—intellectual, emotional, volitional. The so-called faculties of perception, memory, imagination and thought are always implicitly or explicitly present and are successively emphasized in the natural ascent from sensuous to ideal. The extreme "dualistic," "tripartite," and "faculty" views of earlier times have been abandoned or greatly modified, and there is general unanimity in holding that from the functional standpoint the basic unit of mental action is found in the attentive act, and not in either a sensation or a thought.

On the biological side, in lower forms of life, we find adaptation of the organization to its environment. Even here we do not have a completely static condition of organism on one side and environment on the other. There is the functional life process. The plant does not take up all that it comes in contact with; it assimilates that which is necessary for survival. This activity becomes more and more complex as we ascend the scale from lowest vegetable to highest animal life, and in man from infancy through the successive stages of mental development.*

The individual is organized on a principle of well being. No matter how vigorous the personality or lofty the ideal in adult life, at the beginning the individual appears as a complex of instincts, impulses, feelings, hereditary powers. It must not be forgotten, however, that these early elements are teleological in character.

Human consciousness at this stage is not, as Locke supposed, a *tabula rasa* to be written upon by sensations. Nor is it a

*See *The Psychological Foundations of Education*, Harris, pp. 23-37.

dormant potentiality, which must be goaded into activity. The native impulses and instincts of the child are their own alarm-signal. There is a natural hunger of the soul to receive sensations, an impulse to observe and to express; in other words, to develop through activity. The tendency of the individual is essentially progressive. Without this impulse-activity there could be no growth and no education. These instinctive tendencies manifest themselves in movements, and as a result the child has experiences of contact with his environment, and certain sensations and impressions are formed. At the beginning of infancy these movements are apparently purely reflex. The eye follows the light and the hand feels the object because of a hunger for light and touch sensations.

Nor are these reflexes in organic connection. The eye reacts to light and the ear to sound, but eye and ear have no connection. At the end of about the third month the nerves connecting brain-centers take on the medullary sheath and the child begins to be able to make coördinations between different senses. When he sees a light he reaches for it; when he hears a sound he turns his head, and so on. He thus begins in a crude way to form images or adaptations of previous habit to the building up of new experience.

Let us consider the familiar example of a little child learning to make the eye-hand coördination, who while looking at, and fumbling with, a watch happens to press upon the spring and the cover opens. If someone closes the cover the child has a vague, remembered, visual image of the watch as open, and a kinoesthetic impression or image of the feeling of the muscles of the arm in pressing the spring.*

Now, it is a tendency of any image, no matter how crude, to express itself again in some way or other. The sight of the

* See *Biography of a Baby*, Miss Shinns, p. 141.
Principles of Psychology, James, Vol. II, p. 488.

closed watch calls up the image of the open watch and of a pleasurable feeling which it is desired to have again. This visual image reacts upon the tactual, and the motor activity is repeated. There is a feeling of the watch somewhat similar to that of the first fumbling activity, but the attitude is changed, the activity is no longer purely aimless; there is a conscious purpose in view, viz., to reconstruct present experience by changing the form of stimuli received from the watch. If the cover again responds by opening, the activity is repeated. Thus the eye and the hand continue to reinforce each other and a habit of coördination is formed.

Now, in this simple beginning we have in vague and implicit form the elements of the most profound and far-reaching experience of which the human being is capable.

1st. There is a unity of personal experience to be realized. It is the child's own experience, a step in the life process.

2nd. There is a problem, a breakdown of habitual experience; the first fumbling activity may scarcely have arisen into consciousness except as by pleasant, emotional tone accompaniment; but now there is a new coördination. In this case the conscious realization of the process is extremely vague and indistinct. Still there is a problem. The situation is one of a watch to be opened.

3rd. There is the modification of past experience so as to transform it into images of the end which is to be reached and of the means for reaching the end. It is a situation not only of a watch to be opened, but to be opened through the agency of a coördination of hand-and-eye activity. As Professor James says, "In one sense there can be no voluntary activity which has not first been involuntary:" on the first occasion that the hand and eye having united in a movement the result was no longer an eye movement, nor a hand movement, but a third movement—a hand-eye movement which was distinctly different from either of the others or

from a fusion of the two. In the earlier simple reflex to light there was a movement of the entire organism, even involving sympathy of the circulatory activity, but the emphasis was upon the visual phase. Now, in the eye-hand movement there is not a divided activity, partly eye and partly hand, but an undifferentiated unity of experiences, an activity, a tension between the sensational focus of present experience and the future image to which the experience tends in its forward movement.

4th. There is the selection, the development and adjustment of means and ends leading to a new position, and actual experiencing on the part of the child. There is the reaction of the habitual kinoesthetic image which furnishes a cue to the adjustment of hand and eye so as to open the watch. After sufficient repetition the activity becomes comparatively reflex, after which time, if continued at all, it is for the feeling of satisfaction furnished by the activity itself.

Now, a comparison will show that in the classification of a school pupil, considered in Chapter III, we had in the reconstructive process a series of stages corresponding to those in the case just considered. According to this view the later stages do not differ from the earlier so much in the quality as in the complexity of the experience which reveals itself in the successive stages previously referred to; *e.g.*, in the period of later *infancy* the characteristic unity may be said to be the *story;* the present, direct response. In the period of *childhood* it is found in serial order, a relation of means and ends, a history or a scheme, which toward the latter part of the period throws the emphasis on *skill* as the attitude becomes increasingly mediated and indirect. In the *youth* period the unity may be said to be *law, abstraction, generalization;* there is a tendency to seek truth for its own sake, to probe into the hidden meaning of things, to develop technique in a scientific way, and the activity becomes more and more reflective.

According to the theory of the unity of the thought process previously referred to everything depends upon, and is related to, everything else. Voluntary attention differs from involuntary in the complexity of the operation. Perception, memory, etc., are stages of development. The individual is not a passive recipient of sensations such that when acted upon by a stimulus he responds with a movement. There is a fixation of the eye for the reception of light. There is more than simple adjustment; there is a selective and relating activity. The individual is self-active, purposive, selective, lying in wait for, and reaching out after, the right kind of stimulus—that best adapted to his needs. Thus the mechanism of sense perception is not a sensori-motor arc but a sensori-motor circle in which the stimulus to be responded to locates the point of greatest stress or tension.*

Memory is not a bringing back to consciousness of an image previously stowed away like a photograph in an album. It is a genuine reproduction. An image is not a photograph or a kaleidoscopic reconstruction of elementary photographs. It is the adaptation of a former habit to the building up of a new habit which it is desired to have, and images are not confined to the visual type alone but may be visual, auditory, motor, tactual, etc.

This theory exalts initiative to the highest place and makes self-activity the keynote of all progress and, therefore, of all education. Will is the entire personality arresting the movement to see what ought to be done and then moving forward to the attainment of the desired end. According to this view every act, no matter how commonplace, has an ethical bearing. This ethical phase finds its fullest development in religious experience where in the interaction of divine and human love we reach the most perfect reconstruction through the identification of the imperfect self with God—the completely-realized personality.

*See article on "The Reflex Arc Concept," by Professor Dewey, *Psychological Review*, 1896, p. 357.

Such a conception of the thought process when applied in education gives a practical and rational solution to many problems. A proper training of one factor means a training for all the others; *e.g.*, a correct method of acquisition of knowledge will at the same time afford volitional and emotional training. When the principle is properly applied in teaching, development is not arrested by remaining too long upon the lower plane nor by proceeding to the higher plane too soon. The theory holds that the best progress is made when the learner is upon the line dividing the known from the related unknown (if I may use such an expression). There can be no thought properly so called unless there is a problem involving a breakdown in experience and also a power of reconstruction. The stage of advance reached by the learner affords the key to the adaptation of the presentation of the material to his capacity in such a way as to produce the most satisfactory results.

III. The Genesis of Habit.—There are certain habits which we wish the child to form—habits of memory, judgment, thought, appreciation, morals, etc. Psychology shows how the raw material of sensation, interest and impulse is worked into higher forms. It gives an insight into the mechanism involved in the formation and exercise of habits. The purpose, however, is not to develop mechanical habit regardless of the conscious activity of the learner. The main thing is the interaction of consciousness—intellectual, emotional, and volitional—on the part of the child. There must be the formation of definite habits, but not as ends in themselves, not as copies of what other people have learned to do. The purpose is to bring the child to a realization of the meaning of the thing—the desirability of a certain course of action—and then to control his habits in virtue of this realization. Nor is the training to be considered an external end in itself.

There is no true method except in relation to the subject-matter. If psychology is to be of service in education it

is not to be in formulating a species of mental gymnastics by which one is to develop certain phrenological bumps or to train certain assumed, empty, isolated powers of observation, memory, etc., according to the view of the old "faculty" psychology.

Any real training of mental power—*e.g.*, memory—is the training of capacity to be interested in, and to appropriate, certain kinds of facts, and to ignore and forget others. It is training to a right attitude toward the world of truth. The faculty of remembering is simply a power or habit of remembering and goes back to an adaptation of certain original instinctive abilities. The teacher's duty is to assist in the selection of the best material, and in its translation into the child mind so as to bring about such an attitude, *i.e.*, to enable the learner so to direct and control his activity as to appropriate proper material in the quickest and most thoroughgoing manner.

IV. The Sequence of Subject-Matter.—If we take any department of knowledge, *e.g.*, mathematics, and study its origin, history, and present content, we shall find that there was a reason for its origin and that there has been a method in its development. There is a sequence by which each point follows in regular order and grows out of the previous one. This is perhaps clearer in mathematics than in any other department, but the more one looks into any subject the more one sees an underlying principle running through it all. This accounts for the clearness of exposition of the person who has mastered a subject from every standpoint as compared with one who has only a smattering or superficial view. The chronological order of development may not always correspond with the logical order, but there is an order which is best adapted to the learning mind.

Again, certain subjects are best fitted for producing certain mental attitudes—*e.g.*, it has been truly said that mathemati-

cal study is the logic of the elementary school—so that in fixing educational values we must know something of the effect of particular forms of study in the development of special habits of mind. In determining, therefore, the kind of material fitted for a certain stage of life advancement, and the ways in which that material should be presented in order to reach the aim in view, it is necessary to study the subject itself in relation to mental development. It is one thing to possess an examination knowledge of a subject and quite another thing to be able to teach it properly. To accomplish the latter it is necessary to sit down and consider the subject from a new standpoint altogether—to ask oneself, "Why do I teach this subject and how can it best be presented?" In other words, the subject must be "psychologized." An example of this form of treatment is shown in *The Psychology of Number*, by Dewey and McLellan. Psychology may not be able to say with absolute accuracy that a definite kind of material should be given at a definite moment and that it should be presented in a definite way, but it affords the truest available guide to such selection and method.

V. The Conditions most Conducive to Educational Activity.—The advance made by the learner is seriously affected in an indirect way by conditions outside the actual subject to be learned and the direct method of its presentation.

The questions of proper physical, physiological and hygienic conditions, of nutrition, clothing, temperature, light, seating, schoolroom apparatus and decorations, exercise, fatigue, companions, school regulations, discipline, etc., are of vital importance in education. The treatment of such questions belongs to many different departments of study—medicine, architecture, etc.; but into all such considerations, psychology—more particularly physiological psychology—enters as a factor to show the intimate relation of the physical and the psychical, and thus to determine the conditions best suited to highest function.

VI. Application of the Foregoing Psychological Results to— 1st, *The Selection and Arrangement of Subject-Matter.*—Those who, without adequate preliminary investigation, outline courses of study are apt to commit many serious errors.

(*a*) They take no pains to discover what knowledge is of most worth. Having never considered the aims or means of education they have no criterion of judgment. They, therefore, select material at random and as a result much time spent in the schools is worse than wasted whether the results be viewed from the standpoint of utility, or of discipline.

(*b*) They forget the individual to be educated. They conclude to send the child to school a certain number of years. They divide the material to be studied into a corresponding number of equal parts; *e.g.*, addition is to be taught during the first year, subtraction the second, and so on. As someone has humorously pointed out, it seems to them that the creation of a continent for each school year was a providential arrangement specially designed for geography teaching. They look upon the child as a passive recipient into which knowledge can be poured in a mechanical and unrelated fashion. With them he is the best teacher who can keep the largest number of pupils perfectly still through the greatest number of hours per year and who can secure the highest marks for pupils on a final rote memory examination. Such a conception of education ignores the facts that the individual is a personality, a self-active, living organism, that every stage of life is important in itself, and that attitude toward truth is more important than the possession of unassimilated knowledge. This information view submerges discipline, and, on the knowledge side, forgets that not all material is suited to the organs of prehension and digestion of the individual learner at a particular stage of his development.

Fortunately, or unfortunately, human nature usually rebels against a load of indigestible material forced upon it from with-

out. The history of education furnishes countless examples of such rebellion and of methods for its suppression. By many, corporal punishment was adopted as the device to overcome the difficulty, and the enforcement of the motto of the Hoozier schoolmaster pioneer, "Lickin and larnin, larnin and lickin; no lickin, no larnin," has been considered as the only practical solution to the problem. In fact, there are still many who preach an educational gospel which in the ultimate analysis means a return to the "rod" as the panacea for all ills. On the other hand, there are those who by amusing devices propose to sugarcoat the pill until the pupil swallows it, and it has been found that by such a method the pupil by and by forms a habit of taking anything set before him, without complaint.

Many of the devices proposed for making subjects "interesting" are artificial means of bridging over a gulf which exists between the child mind and the subject to be studied, a gulf which is seldom found when the material is properly selected and presented.

The result of creating false tastes and of yielding to every capricious whim of the child—of making everything so easy that there is no obstacle—is to produce an effeminate and priggish superficiality; and with such results so much in evidence it is not surprising that there should be a reaction against methods which make everything easy and interesting.

Now, as there has been greater diversity of opinion regarding the signification of the word "interest" than of any other word in the vocabulary of education, it may not be out of place to turn aside for a moment to point out several misconceptions. The claim that the material should be suited to the stage of development of the pupil does not imply the removal of all obstacles, but merely the unnecessary ones. The material will still present obstacles; if it did not it would be devoid not only of interest but also of educational value.

Anyone who has observed a game of rugby football should have no difficulty in realizing that an activity may be most strenuous and at the same time most fascinating.

As we have seen, unless there is a problem there can be no thought activity properly so called. The great law of interest is to regulate the tension between the known and the unknown in such a way that the exercise will not be too easy and yet not so difficult as to induce discouragement. All achievement worthy of attention is full of difficulty and any proper line of educational work will present sufficient obstacles without creating new ones. The whole question of interest reverts to habit and attention. If the material is so selected and presented that the child has a desire to do something that is really worth while, and realizes that the difficulty has a genuine relation to what he is doing, and that by overcoming it he will be nearer the accomplishment of his purpose, he becomes interested in the activity. He realizes that it is a something which is to be attended to in order to reach his aim, and he experiences a pleasure from each successful achievement which spurs him on to future endeavor.

The teacher's problem is, then, not to find what is interesting, nor to make things interesting, nor to remove all obstacles, but to bring the child into a sphere of objects and relations which are most worthy of his attention at this stage, and then to bring him to a consciousness of the meaning of the thing and to direct his activity upon the point of greatest difficulty so that he will not only overcome obstacles but form a habit of looking for and overcoming them.

To return to the former discussion, the advocates of the pouring-in process fail to realize that the little residuum of knowledge which remains (for most of it is quickly forgotten) is comparatively worthless. In order that the presented material become of service to the learner it is necessary that the mind reach out and lay hold of the material and work it

over into a vital part of its own experience, a helpful part of its powers of action.

The material to be learned is not something which hangs in the air statically. It exists in the consciousness of other people. Certain experiences have been gone through and certain facts formulated and systematized. This material must be detached from its native setting and translated into the consciousness of the learner. It must not be put into him; he must put himself into it, and the teacher's business is to show him how to do that.

Let us cite an example from the teaching of geography, a subject in which the pouring-in process has been adopted with but little adverse criticism. Some thirty years ago a certain pupil during his first year of geography study spent a number of weeks in drilling upon the names of the productions of the respective states of the American union. The lists were committed by a pure effort of verbal memory. No attempt was made to show why the material should be learned or to relate it to climate, relief, or any other fact-producing principle. No problems of any kind were presented for solution. The result is that although at that time he could recite them all with ease he now remembers the productions of only one state, and as, owing to various causes, the products of this state have changed the remembered list is incorrect.

Now, it cannot be said that in the case quoted the failure was due to lack of knowledge or of aptitude on the part of the teacher, for she possessed both in unusual degree, nor can it be asserted that she had suffered from pedagogical training, for she had never received any. She also possessed a free hand as regarded selection of material to be taught. She simply followed a method which still dominates much of geography teaching.

There are many classes who experience a shock if the map is hung with the so-called "south-side" nearest the ceiling. They

have the feeling that the map is an end in itself, a something which is studied on its own account. The idea of actually relating it to experience outside the school has never entered their minds.

Geographical study may consist simply in committing by rote certain definitions and lists of names of places without discrimination or purpose, just as one might learn the epitaphs and names of unknown persons from the tombstones in a cemetery.

To the properly-educated man geographical knowledge is not, as in the case alluded to, a dead weight of unrelated and unassimilated information. It is an attitude of mind which gives meaning to things. The simplest object of field or forest possesses value, not so much for what it is in itself as for what it represents. The map serves as an instrument with the aid of which the imagination constructs the actual scene and views it in proper perspective. A knowledge of present conditions is sufficient to enable such a one to anticipate erosion and upheaval, the building of cities, and the growth of nations. Such an attitude can be gained only by a proper adaptation of material to the conditions of the learner.

(*c*) Those who prescribe courses of study may fall into the opposite error and make the child the be-all and end-all of education, ignoring external factors. Now, the subject-matter of education has been obtained from the general world of experience, history, nature — sources entirely independent of the child. It has been pointed out that the purpose of education is to socialize the child, to enable him to gain a power of interpreting his experience through the resources that have been worked out and which have been inherent in the continued process of civilization. Evidently if the learner is to overtake in a few years what it has taken centuries to accomplish there must be some way of improving upon the original method of acquisition. Society furnishes the teacher for the purpose of facilitating this process.

The extreme advocates of the "development" theory have forgotten that one of the fundamental principles which render education necessary is that the material (dynamically considered) is not within the child and that it is desirable that he shall be put in possession of it. The extreme advocates of the "nature" theory have forgotten another fundamental principle, which is that it is necessary to "short-circuit" the process extending over thousands of years so as, if possible, to gain its best results in the relatively brief period of, say, twenty-one years preceding adult life.

Perhaps sufficient has been said in the early part of this chapter to show how by the study of stages of development and materials fitted to these stages the teacher may be aided in avoiding errors and making a proper choice of subject and sequence.

The courses of study outlined by Froebel for the kindergarten, by the Committees of Ten and Fifteen for elementary and secondary schools, by Dr. Dewey in *Society and School*, and by Dr. Harris in *The Psychological Foundations of Education*, furnish prominent examples of efforts which have been made to effect a classification of material for a particular period with due regards to the needs of the individual and of society.

2nd. *Methods of Teaching.*—In the reconstruction of the learner's experience the teacher endeavors to facilitate the translation of the richer content of the social consciousness into the crude consciousness of the learner; *e.g.*, suppose a child has reached a point where he is ready to learn how to multiply decimals. Now, the something which the child is to gain does not exist in the book. The book statement is an abstraction of it. The teacher's conscious experience of multiplication of decimals is an ability to adapt previous habits to the building up of a new experience, a bridge from one experience to another, a device for facilitating and enrich-

ing conduct. As a result of this power the teacher can solve problems and thus reach ends which the pupil cannot reach. It is this kind of instrument which the child is to gain possession of.

As has been pointed out it is one thing to know the facts of a subject and quite another to be able to teach the subject well. This is especially evident in elementary work. To the teacher preparing an introductory lesson on multiplication of decimals such questions as the following demand consideration:—What new material is to be presented? What representative material shall be used in interpretation? How shall the former experience be brought to bear upon the new presentation? Is it well to begin by facing the pupil with a difficult, practical life problem, involving multiplication of decimals, and to allow him to flounder a little before offering him further suggestions? Should he discover the method for himself? To what extent should the teacher suggest? Should the pupil make the discovery through the adaptation of his previous habit of multiplication of fractions or would it be better for him to adapt his knowledge of simple multiplication and notation of decimals without any direct reference to fractions? Would it be wise to begin with the multiplication of a decimal by a whole number of one digit and then to proceed by increasingly-difficult steps? etc.

Now, such questions as the foregoing arise in every lesson no matter what the subject may be, and they can be properly answered only after a careful study of the relations existing between the learner and the material to be learned.

An examination of the work done by the best teachers—those who have and those who have not received professional training—shows that, consciously or unconsciously, they strive to answer satisfactorily these questions by adapting the subject to the requirements of the learning mind. Further, there is universal agreement that certain methods are preferable to certain others; *e.g.*, thirty years ago the student, in learning

the preposition in English grammar, was asked to memorize a list of prepositions—"about, above," etc.—and when in parsing he came to a word mentioned in the list he was expected to parse it as a preposition because it was included in the list learned.

The student now approaches the subject from an entirely different standpoint—that of the function or force of the word in the sentence. In this way he quickly gains an insight, by which he can independently make as satisfactory a list of prepositions as that which pupils were formerly asked to memorize, and, further, he understands why the possession of such a list is entirely inadequate.

It will be generally conceded that the statement that the latter method of teaching the preposition is superior to the former method is as true as the statement that "similar triangles are to one another in the duplicate ratio of their homologous sides." And yet notwithstanding all this there are many good teachers who are vigorously opposed to all study of method. It is urged that the student-teacher blindly copies the method taught, that the model presented may not be the best, that the method may be unsound, and that the copy is always inferior to the original. Further, it is claimed that an effort to arrive at method in a scientific way is from the nature of the case doomed to failure.

Now, an analysis of these objections will show that they arise either as an adverse criticism of the abuse of method, or from a static view of education.

In the first place, every teacher must adopt some method. It is perhaps not surprising that one who has heard "method" exalted out of all due proportion, or seen devices for creating a false appetite or unnatural interest, should go to the opposite extreme and say, "I do not believe in method; I try to have none." And yet anyone who teaches must teach in *some way* and a description of what is done would be a description of the method used.

The teacher who teaches multiplication of decimals by having pupils simply learn the rule and apply it to the problem may consider the preparation of the lesson and study of mental processes entirely unnecessary, but still he has a method. Further, he is likely to defend his method with the argument that "it is better not to waste time in trying to explain such rules to young children, but to teach them the facts, and by and by they will understand the reasons." This argument, it will be observed, is an appeal to mental process as the final criterion. There is merely a difference of opinion as to what the actual psychological facts are.

In the next place, the "blind imitation" of a model by the pupil in ordinary school work, or by the student-teacher in learning how to teach, is entirely opposed to the dynamic conception of education previously referred to. The ultimate test of any method in any subject is, Does it in the best way enable the child to translate the social material into his own consciousness so that it becomes part and parcel of himself, an instrument for future control? If the saying "as the teacher so the school" means that the child imitates the teacher in a blind way, always following where the teacher leads and learning nothing but what the teacher tells him, the result is most disastrous. As an example of the results of such imitation consider the case of an adult who goes to a large city for the first time, and has a friend who takes complete charge of him and acts as guide on all occasions without explanation. If the newcomer submits passively and unobservingly to these conditions he may find the experience very restful, but the longer he follows this course the more completely "at sea" he will be when left to himself. It is a matter of everyday experience that by such a method a person often becomes "turned" as regards direction—so that, *e.g.*, west appears south—and is never again able to orientate himself properly, no matter how faithfully and continuously he may strive to do so.

Imitation is a valuable factor in education, but not when it limits individual spontaneity and consists simply in copying an external model; *e.g.*, a child learns to swim more easily if he sees others swimming, and has a model to imitate, than if left entirely to himself, but the impulse to swim is not dependent upon any external model. By devoting sufficient time to it a child under favorable conditions will learn to swim without any model or instructions. The advantage of the model is that it enables the learner to eliminate a number of the elements or factors of purely individual experimentation. By judicious imitation he saves time, gets quickly to the coördination, and omits the intermediate guesses, and, as we have seen, this is a point in which true education improves upon the process of "nature." Such imitation does not simply furnish external models for the child. What it does is to furnish only those which fall in line with his own natural tendencies, in order to save the waste of too-long-continued experimentation and to guard against the formation of incorrect habits.

Similarly, such "method" can itself become an instrument for the teacher only when he has reflected upon the subject in its logical relations and upon the manner in which it is assimilated by the mind in relation to other studies so as to become a factor of control. This means that the subject must be studied from the logical and psychological standpoints, in ways indicated in the earlier part of this chapter.

In addition to methods of teaching which have been developed theoretically along the lines just referred to there is a body of empirical method which the history of education shows to have been worked out in a practical way and to have stood the test of experience. The value of such methods to check up and accentuate the more abstract theoretical formulation is considerable and the science of education can scarcely afford to discountenance all that has not been discovered by

laboratory methods. Everything which in any way contributes to educational facilitation is of value and properly belongs to the theory of educational science.

To recapitulate, it has been thoroughly established that the mind does not work in a haphazard fashion but that there is continuity and relation throughout the entire life process, that there are certain characteristics of successive stages of development common to all children, and that it is possible to present stimulus in such a way as to direct the learning activity by means of external influence. Further, all these phases admit of investigation and can be sufficiently understood to render it possible to determine with a considerable degree of accuracy what kind of stimulus should be furnished at a definite time and the best method of presenting it and of directing the learning activity. It, therefore, follows that much can be learned concerning the best methods of teaching and that no lesson can be properly taught without careful preparation on the part of the teacher both as regards matter and method.

3rd. *External Conditions of Study.*—In no other phase of school life in America has the improvement been so marked during the past few years as in the environment of the child during school hours. As indicated on p. 67, these changes have been due to a study of the needs of the child and also of the various departments of knowledge—such as school architecture—which relate to the different forms of requirement.

Illustrations.—The following are submitted as illustrations of ways in which such training as that to which I have referred may prove of actual service in the schoolroom. The first deals with a physiological, the second with an ethical, and the third with an intellectual phase of school experience:

1. *Treatment of Myopia.*—A gentleman who is a well-known authority in a science department of university work has been kind enough to allow me to make use of the following statement:

"From earliest childhood I was very nearsighted, but I was nineteen years of age before any person mentioned the subject to me or suggested that I should get glasses. During these years I had at least a dozen different teachers and was personally acquainted with a number of physicians who were friends of our family.

"At school, in the seating of pupils, no attention was paid to visual or auditory defects, and the result was that I was usually placed in a part of the room where I could read little or nothing of what was written upon the blackboard. When the teacher wrote problems upon the board and repeated them orally I tried to remember what was said, but when they were written without reading or explanation I was quite at sea. However, I succeeded in making a good showing in my studies, and this probably was one reason why the defect of eyesight was unnoticed.

"I fared even worse on the playground. I could not hit or catch the ball, being unable to see it in time. I was often hurt and being considered clumsy was not chosen in a game when other material was available. The result was that finally I was simply debarred from all sports. I got credit for being dreamy and for not observing closely. It was a common occurrence for a friend to remark, 'I guess you must have been dreaming again to-day. I passed close to you on the street and you looked at me and passed right on.' I would answer, 'Why, I don't remember meeting you!'

"Apparently by the merest chance, one day when I was groping about for something a friend said, 'You are nearsighted; you ought to get glasses.' This was, as I have said, when I was nineteen years of age.

"I consulted an oculist and after he had examined my eyes asked him if he thought I needed glasses. He laughed and said, 'I was wondering if you didn't need a little dog and a string to lead you around.'

"My glasses were a complete revelation to me; they opened up an unseen world and for days I had difficulty in adjusting my sensori-motor mechanism to the changed conditions."

Now, it is probable that upon reading the foregoing statement any teacher of the "dozen" referred to would admit that the oversight was a serious one, and would be surprised that anyone could have failed to notice the abnormality. The facts, however, that statistics show that such cases of defective eyesight are much more common than is usually supposed, that

the tendency of most school conditions is to increase the difficulty,* and, further, that without previous training the defect is almost invariably ignored by the teacher, should be sufficient reason for adopting some other method than that of trusting to the teacher's unaided intuitions.

In a properly-conducted training course such a difficulty is anticipated, and the methods of overcoming it investigated in such a way as to render a subsequent error, of the nature of that in the example quoted, practically impossible.

One of the earliest facts learned in psychological study is that there can be no knowledge without a basis in sense presentation. In an investigation of correct and incorrect applications (on the sensory and motor sides) of this and related principles the fact is emphasized that there must be sense presentation at every stage of mental development and more particularly in elementary work. Such discussion opens up the consideration of a wide range of schoolroom subjects. One of these is the utilization of the school blackboard. It is found that to secure the best results it is necessary that the blackboard be brought into frequent requisition and that what is written upon it be seen by every pupil. An analysis of the visual process reveals the fact that there are many ways in which this desired result may be prevented; *e.g.*, if the blackboard is defective, if the word is improperly written, if the lighting is imperfect, if the teacher stands between the pupil and the written word, if the eye does not function properly, if the optic nerve or cerebral centers are diseased, if the mind is intent upon something else—in none of these cases will a proper perception be made.

In the investigation of that particular phase of interference presented by defects of the eye it is found that myopia is by far the most frequent and important source of trouble. Thus by a definite process of analysis the student is brought face to

*See *Natura Forschung und Schule*, Preyer, 1887.

face with the problem which had been overlooked by the teachers in the illustration given.

In the investigation of this problem the teacher in training studies the anatomy and physiology of the eye in considerable detail by dissection and from model. He reads widely on the subject so as not only to understand the conditions but also to understand them in their relation to classroom work. The latter point is worthy of emphasis. The physicians who were acquainted with the boy in the case described above were no doubt quite familiar with the technical details of myopia and they had, in all probability, never considered the subject from the educational standpoint.

The student-teacher investigates methods of diagnosis and treatment. There are numerous ways of detecting myopia. Pupils who are shortsighted may be asked to report privately. The teacher may notice that a pupil is straining his eyes, that he holds the book close to his face in reading, etc. It is better at the beginning of the term, in all cases, before seating a class, to have a visual and auditory test. A skillful teacher will, without any special apparatus, make such a test in a few minutes by easily-available devices, such as writing small letters or speaking in a low tone. Instead of seating pupils alphabetically, as is often done, the trained teacher seats them in such a way that they will be able to accomplish the best results. Further, it is often wise for the teacher to suggest to parents the advisability of consulting an oculist and securing proper glasses. The idea, so often proclaimed, that parents are inclined to resent such an act as an unwarrantable interference is, so far as my experience goes, purely mythical. Parents are usually eager to coöperate with the teacher in securing what is best for their children.

Now, a teacher who has been trained along the lines indicated —and teachers are so trained in every good training-school— has formed a habit of dealing with such problems, is always on

the alert for such obstacles, and as a result would have detected the defect in the example quoted. I think it will be generally admitted that a teacher who had received such training and who still neglected to apply it should not be allowed to teach, and also that there is some excuse for those who have investigated such subjects carefully, and know how easily the wrong may be righted, when they protest somewhat too vigorously against what seems to them to be little less than criminal negligence.

2. *Treatment of a Case of Truancy.*—A boy was brought by the truant officer to the private room of the principal of a city school. He was reported as an inveterate truant, idle, but not vicious. On the last occasion he had succeeded in playing truant for over a week without detection. He had the down glance and uncouth appearance characteristic of the boy who has come to the borderland of tramp life.

At first he was reticent and sullen, but upon being convinced that the conversation was confidential, that the purpose was to try to get at and understand the situation, that the school principal was really interested and sympathetic, and that from the conditions of the case he must do the talking himself if anything was to come out of the interview, he slowly changed his attitude and finally talked quite freely.

He said he hated to go to school. The other scholars in the class were younger and smaller than he, and he couldn't learn fast. Some years ago a large boy had coaxed him to play truant and he had played off and on ever since, sometimes with other boys but recently mostly by himself. When he played truant he didn't think about anything in particular. He just watched the birds and things. Sometimes he went in swimming. He was fourteen years old. He supposed if he hadn't played truant he might have been promoted to a higher class, but didn't see much use in it anyway. He didn't know what it was to be a citizen, or to have a vote.

He knew who the mayor of the city was. He was at the torchlight procession when the mayor was inaugurated. He hadn't thought anything about what he would be when he became a man. The difference between twenty-one and fourteen was seven years. He could remember seven years back and that didn't seem very far to look forward to. He supposed he would have to do something when he grew up. No one had ever asked him what he intended to do and he hadn't thought about it at all. His mother was dead. His father was a tailor; he didn't think he would like to be a tailor. Finally, he said he would be willing to go down to his classroom that day and come up the next morning and tell the principal what he had rather be when he grew up.

He went to the classroom, was as idle as usual, but seemed more thoughtful. On the following morning he was waiting at the office when the principal arrived and imparted the information that he had made up his mind that he wanted to be a motorman on a street car. He expressed his willingness to go to the classroom and consider the ways in which school work might help to make him an efficient motorman, and report the following morning. During the day he seemed more interested in the work and his attitude had certainly changed for the better. The following morning he surprised the principal with the remark that he had concluded that he didn't want to be a motorman; he wanted to be a conductor, and assigned some reasons for the change of opinion. He was asked to report the following morning on the previous problem applied to the new conditions. He did so and furnished from memory an extended list of ways in which school study would fit him for the position of conductor. The first was that he would know how to make change, and the last that he would know how to be polite to ladies and gentlemen. He said he was willing to try to prepare himself to be a street-car conductor and believed he could keep from playing truant for a month. He undertook to make good his inference, and

with the help of a judicious and sympathetic class teacher he speedily effected a reform. The school conditions were much the same as before, but he had found himself, he had become properly orientated, and the work was interesting because it was work to be attended to. During the next six months he never played truant and at the conclusion of the term stood well up on the promotion list. After that there was no difficulty.

I hope this example will not appear trivial. I have mentioned the details of the experience just as they occurred, because it is typical of a large number of cases which arise in every elementary school. The treatment may not have been the ideal one, and would certainly not apply to all cases, but in so far as it was successful the satisfactory results were due largely to an application of certain principles with which one should be familiar before taking charge of a class. Let me suggest a few of these:

Before prescribing for a disease it is important to make a proper diagnosis of the case. A depraved condition is not reached in a few days. It is the result of habit and this habit is usually due to some influence unknown to teacher or parent. For a pupil who has done wrong, frankly to look at his case and to discover for himself the error, its cause, and remedy, is usually the first step toward reform.

To be of value such investigation must be made of the pupil's own free will. It will not be made in this way unless the teacher is *really* in sympathy with the child. A good way to correct a bad habit is to appeal to a worthy interest and, if possible, have attention centered upon it until the individual identifies himself with it as an end to be realized.

There are those who say "such rules would be of no service in such a case. There is an instinctive something which guides the teacher to an understanding of the actual conditions, and if he has not that natural power no amount of training will

give it." Now, it is true that in the particular case quoted the school principal did not think of a set of rules in succession to see which might apply to the particular case, and yet he is positive that had it not been for a preliminary reflective study of children and of the psychology of volition it would never have occurred to him to adopt such a course as he did adopt.

There are facts concerning children which are known by every experienced teacher and which are at great variance with usually-accepted opinion; *e.g.*, I have known very many cases where boys have been given an option between a three days' suspension from school and corporal punishment. I never knew of a boy who did not select the corporal punishment in preference to the suspension. Teachers of long experience see nothing remarkable in such a statement while those who have not had experience with groups of boys are inclined to view it as incredible. In a professional training course such as I have referred to the student-teacher follows a line of analysis similar to that indicated in the former example of myopia, but in this case leading to a consideration of the subject of truancy. He investigates the subject from the standpoint of ethics, of child study, of the formation of habits, and of detailed concrete cases similar to the foregoing in which certain remedies have proved effective. In so far as is practicable by actual contact with children in the classroom he forms a habit of rational investigation. Thus he gains an insight which enables him to deal with such cases in his subsequent teaching experience, with a skill which he would never have attained if left entirely to himself.

3. *Treatment of Nonhabitual and Habitual Coördinations.*— I shall conclude by an example of the application of psychological fact to educational science in a specific field of the attentive activity. The following are three out of very many psychological facts which have been established in the study of attention:

1st. To concentrate attention upon a difficulty to be overcome aids the reconstruction. The power to inhibit irrelevant matters, to confine one's attention to the subject in hand, means mastery of the difficulty with the minimum expenditure of time and energy.

2nd. To concentrate attention upon a well-established habit is to arrest the activity by interfering with the fluidity of the process.

The ordinary experience of stage fright is a good example of this. The performer may know his lines perfectly, but the extreme self-conscious concentration causes him to stumble and halt. One finds it impossible to walk a plank fifty feet above the ground, not because the operation is more difficult than in the customary position, but because realizing the danger of making a misstep one concentrates the attention upon a habitual activity which requires no concentration, and this concentration produces an artificial activity of weak and erratic coördinations. This affords an explanation for the success of the method of concentrating the attention upon something else in such a way as to leave the habitual activity free from interference.

3rd. As a result of these two facts, and of the principle of the "unity of attention" previously referred to, it follows that in any activity the quickest reaction or reconstruction is made when the attention is focused upon the point of greatest difficulty and when the comparatively habitual reflex phases of the activity are neglected.

When this third fact is brought as a contribution to educational science it assumes the form that (in learning) the focus of attention should be directed upon that part of the problem which presents the greatest difficulty and habitual activities should be allowed to take care of themselves.

The following are everyday examples of ways in which such a principle may be applied in the schoolroom :

(*a*) In learning how to spell the word "island" a pupil who has studied phonics, and who hears the word pronounced for the first time, is able without any assistance, and without having ever seen the written word, to spell the word correctly, with the single exception that he omits the letter "s." Time spent in emphasizing the five self-evident letters is worse than wasted. Attention should be given to the real difficulty presented by the silent letter.

(*b*) In learning simple addition, when proceeding from problems which do not to those which do involve "carrying," the entire activity is habitual until the pupil reaches the point where he has summed up the first column which gives a greater total than nine. He has then simply to apply the previous knowledge gained in the study of notation to the peculiar obstacle presented by the new situation and this is a comparatively easy task if the attention be not unnecessarily spread out over other subjects requiring no investigation.

Such a list might be extended almost indefinitely and still include cases where this principle is being violated every day and where by exercising care the value of the work might be doubled.

Now, the teacher in training should in this case, as in the two previous examples, follow a line of investigation which will render the principle consciously explicit and form a habit which will ensure the application of the principle in future work.

An analysis of the attentive act in relation to educational procedure suggests the problem. Then follows an investigation from the theoretical and practical sides. A good example of the systematic way in which such problems are now being dealt with is furnished by a series of experiments conducted by Professors Angell and Moore and described in an article entitled "Reaction Time: A Study in Attention," *Psychological Review*, 1896, Vol. III, p. 245.

These experiments establish beyond a doubt, from the standpoint of experimental psychology, the truth of the principle of attention to which I have just alluded. Experiments have also been performed in the schoolroom which demonstrate the fact that children do learn more quickly when attention is withdrawn from the easy and habitual and directed upon the new and difficult coördination.

The fact thus fully apprehended, the student-teacher, as in the preceding examples, proceeds to consider methods of diagnosis and treatment.

CHAPTER VII.

THE TECHNIQUE OF EDUCATIONAL SCIENCE.

In the previous chapters I have endeavored to prove that a science of education is possible and that the professional training of teachers is a necessity. I shall conclude by a brief consideration of the present content or technique of educational science, and of ways in which this content may be improved and increased.

The number of publications on any one of the subjects referred to on p. 12 as forming part of a teacher's training course is very great, and the bibliography* of educational science has now become in itself a study of no small proportions. An attempt to enumerate these publications or to classify them according to order of merit would be quite beyond the scope of the present work.

While it must be admitted that much of this material when measured by a correct standard is found wanting it is also equally true that a large portion of it is the result of a highly-specialized type of investigation and has survived for a sufficient period of time to show that it has proved of practical value in the solution of educational problems. Notwithstanding this valuable residuum I think it must be conceded that educational science has not made progress commensurate with its possibilities and importance.

* See *Bibliography of Education*, Munroe.
Bibliography of Education, Hall.
Bibliography of Education, Hodgins.
Books on education in the libraries of Columbia University, *Library Bulletin No. 2.*

Preyer in speaking of German schools says (*Nature Forschung und Schule*, Zeit 3, 1887), "During the last decade nature investigation has without doubt gained greater influence than ever before—on almost all sciences and arts, on industry and means of communication, on the relations of men to one another and to the world. In ever-widening circles its growing power is felt; and this activity is greeted by some with joy as the greatest culture advance; by others recognized with regret and opposition. In only one of its titled territories has the newer nature investigation until now not planted its flag, viz., *in the school*. In a surprising manner, during the general forward development of human training on a natural, scientific basis, the schools—the special institutions for development—have remained behind. They have in the midst of the fresh spring green of the present retained the withered leaves of the former time."

The advances made since the time when Preyer made this statement have been great, but they are scarcely to be compared with what will be accomplished when the full meaning of the *new* scientific attitude is thoroughly comprehended and rationally applied in education.

Many deterring influences which were then rife have not yet vanished and it may not be out of place to examine a few of the conditions which have retarded the growth of educational science.

1st. It sometimes happens that incompetent persons are appointed to the supervision of educational affairs or to positions as instructors in teachers' training-schools. Possessing no faith in educational science and no practical knowledge concerning it, instead of leading the way, and inspiring and encouraging to better things, they act simply as clogs upon the wheels of progress.

A striking illustration of the results of incompetent supervision is afforded by the history of the educational system

of the kingdom of Greece as outlined in an article—"Der elementar unterricht im Konigreich Griechenland"—by Ch. Pamarku, Athens, in *Deutche Zeitschrift für Auslandisches Unterrichts wesen* for October, 1900. The article states that, from 1834 to 1895 there was a steady advance in education. At the latter date the system had become well organized. There was careful and intelligent supervision from the "Ministry of Education" down. The finances of the system were placed upon a sound basis. There were free schools, trained teachers, compulsory education, etc. During the three years immediately preceding 1895 the yearly attendance increased from 60,000 to 158,644 pupils. The writer goes on to say:—

"On the 27th of September, 1895, the law concerning elementary and common school instruction was passed, which is still in force. By the 78th article of this law all laws and other regulations which until then had had some influence on the advance of common-school instruction were repealed.

"According to this law, which probably stands alone in the history of education in civilized countries, the duty of supervising and regulating public instruction was taken from the minister and transferred to inspectors and supervisory boards, that is to say, higher clergymen, land owners, merchants and manufacturers, physicians and lawyers, directors of private schools and pensioned military men. The local boards were completely ignored and made servants of the inspectors, as these and the supervisory boards took from them the right to govern the schools in their communities and even deprived them of the privilege of supervising them. The teachers were robbed of their independence and made flatterers and servants of the inspectors, being forced to ask them for appointments, for continuation in their positions or rank, or for nontransference and nondismissal. The unity of the public-school system is destroyed, as the management lies in the hands of fourteen different supervisory boards and an equal number of inspectors. Thus there results a confusion and chaos in the condition of the public schools, as now there remains only an absolutely insufficient and unsafe foundation, viz., the income of the communities. The instruction itself is ruined and torn into shreds. The unified and printed programs existing until then are thrown to the scrap pile

and are replaced by the most widely-varying theories of education and instruction held by the inspectors of each locality. Without warning schools are closed, opened again, diminished and enlarged. With all this the money of the state is wasted, as cannot be otherwise with the different supervisory boards, subject to no higher authority, and to no supervision, swaying back and forth, and with the other concealed, influential elements back of them."

In training-schools the evil effects of such appointments are not so evident as in supervision, but in the end they are, if possible, more disastrous. From such instructors the teacher in training is almost certain to gain an attitude toward educational science which renders subsequent contribution impossible. The work of the course often degenerates into a grind on "methods" outlined in prescribed text-books, or into a blind imitation of a teaching model furnished by the instructor.*

In cases where the instructor possesses scholarship but no professional knowledge there is a tendency to adopt the theory that the one thing requisite in such a course is to gain a more thorough academic knowledge of the subjects which the students will subsequently be required to teach. The time is then devoted to a study of nonprofessional subjects and to preparation for a final examination which is professional only in name.

This latter type of training is to be preferred to the "method" grind, for the student gains a more thorough knowledge of the subjects to be taught and this, as we have seen, is a most important factor in the teacher's preparation. Nevertheless as a professional training course for teachers it fails for two reasons: (1) The mastery of a subject on the academic or scholarship side can be more economically and satisfactorily gained at a high school or university than in a professional training-school. (2) No matter how familiar the teacher may be with the facts of a subject, no matter how

* See article on "Lessons of School Exhibits at Paris," by Miss Smith, *Educational Review*, Vol. XXI, p. 176.

thoroughly he may have prepared for his academic examination, he is still unprepared, without further consideration, to present the subject to a class. He must reconsider the subject from the standpoint of the learning activity, must study its genesis and logical relations, and prepare himself to translate it into the consciousness of the learner. He must put himself in the learner's place and give heed to countless considerations which are in no sense included in the preparation for a university examination.

This reconstructive work legitimately falls within the scope of a professional training course, and can be properly conducted only when the instructor is fully alive to the necessity for such reconstruction and thoroughly prepared for the work, not only by an academic knowledge of the subject but also by a previous practical investigation of educational problems.

2nd. Further, much of the tardiness in the advance of educational science has been due to the fact that probably in no other profession has there been such great waste of good material and so much unscientific production as in teaching. A large percentage of those who have been engaged in educational work have never contributed a single iota to educational science. There have been excellent teachers who have passed away in silence whose experiences if recorded would have been of inestimable value to education. There are many teaching at the present time who from undue modesty, or from the pressure of daily duties, neglect to give expression to the results of their experience and hence fail to contribute an assistance to their fellows, which would be of more lasting benefit to the race than will accrue from much of that which now occupies their attention. On the other hand, there have been a large number who have contributed but whose productions are comparatively valueless owing to unscientific methods of investigation. So much is this latter the case that one of the greatest problems confronting the young

student of educational science is how to select the valuable and discard the worthless.

The laws of control most adequate to the needs of the situations which arise in educational work are not learned by casual observation nor by practical, everyday experience. They are discovered and verified only by careful and continued investigation just as are the laws of any other science. Educational advance has suffered severely from an ignoring of this fact. The result has been, on the one hand, to proceed empirically, depreciating all experimental work, and, on the other, to experiment, but to experiment unscientifically. There has been a tendency to prejudge the case and formulate hastily-constructed hypotheses. Where experiments have been performed they have not been properly guarded from error nor continued long enough to warrant any definite conclusion. With some experimenters a certain hypothesis was to be established, a few unscientific observations or experiments were made which could be interpreted in such a way as to support the preconceived theory, and it was forthwith propounded as an established scientific fact.

Other experimenters have gone to the opposite extreme. They have proceeded in an aimless fashion to collect trivial and unrelated facts, leading nowhere, in order (Micawber-like) to see if "something would turn up." They have simply observed at random and described what they have seen. As a result much valuable time has been spent in collecting data which twenty years hence will, in all probability, be forgotten, having produced little or no practical result. An eminent geologist has said that when on an exploring expedition he always has a number of geological hypotheses in the foreground of his consciousness each clamoring for confirmation or disproof, and much of the educational investigation of the past would have been more valuable if the experimenter had proceeded in a similar way.

Another waste of energy has been in the reduplication of experiments through ignorance of what has been already accomplished. A good illustration of such repetition is afforded by the history of the problem of primary reading. There have been thousands of experiments performed to test the merits of different systems—the alphabet, the word, the sentence, the phonic, or some form of eclectic method. Many of these investigations have been fairly scientific, have cost large sums of money, and have extended over many years. The results have established certain facts beyond all question; *e.g.*, that for the most rapid acquirement of power of word recognition a certain use of phonics is indispensable. There are certain other points upon which the conclusions are not so clear; *e.g.*, the value of diacritical marks. Notwithstanding this there is scarcely a city in which there are not some schools where instead of directing attention to unsolved problems these historical experiments are being repeated in the pioneer stages and will be abandoned before they reach the high-water mark of former investigation.

Another illustration of this is furnished by some of the nature-study courses put upon the educational market a few years ago as new discoveries, but which seem like copies, marred in transfer, of a course carefully worked out and applied in an eastern normal school twenty years ago. They are not copies however. The discoverer of each, ignorant of what had already been done, had found the entrance to a mine of wealth, but with less skill and with ruder implements than those who preceded him, had not secured as valuable ore as they, nor had he even entered the chambers of richer metal now being mined by others whose contributions are an improvement on all preceding work.

The farmer of sixty years ago cut his grain with a sickle. Thirty years later he used a cradle with which he could cut five times as much as with the former implement. To-day he

rides a machine by means of which he performs with ease a task which a hundred men by the sickle method would find difficult to accomplish. Much of the educational experimentation of the present time is like that of a man who, ignorant of later inventions, devotes himself to the improvement of some kind of cradle.

In no other sphere of labor is it so true as in education that half the world do not know how the other half live nor how their ancestors have lived.

A few years ago in the heart of old London, so famous for its wealth of literary production, I observed a school class laboriously learning to read by counting one for the commas and four for the full stops. In European countries, renowned for their educational institutions, I visited schools where rows of pupils were seated at long, old-fashioned desks, on benches without backs, where the children's feet did not touch the floor, where some of the pupils faced a wall less than three feet from their eyes, and where in one class pupils were learning arithmetic by copying long-division solutions which had been worked out for them, and were varying the monotony by here and there inserting a mistake. However, it would be entirely incorrect to say that these examples are typical of all European schools. As a matter of fact it would be difficult to find better work than was done in another classroom of the same building in which the foregoing reading incident occurred.

Nor is it necessary to go to the Old World to meet with schoolroom surprises. If those who insist that "the teaching of our schools has become too objective and too interesting" were to visit certain of these schools they would be speedily disillusioned. The fact is that many educational critics have taken their cue from a brief observation of an isolated experimental station or from the public address of some extremist and have proceeded to criticize on the basis that these represent the universal conditions.

What is needed, perhaps, most of all is a careful summarizing of the best that is being done and has been done, a history of education, prepared by a committee of trained experts who have set themselves resolutely to work in a truly scientific spirit to separate the wheat from the chaff, to consign interesting curiosities to the museum of antiquities, and to "boil down and sugar off" the best that has been discovered in all times and in all countries. Such a compilation must be available if mistakes are to be prevented and the best results obtained from the expenditure of energy. Much is now being done in this direction and much more must be accomplished before the student of educational science can hope to have a fair start as compared with students in other departments of scientific research.*

A professional training course should combine the theoretical and the practical. The staff and equipment of the training, practice, and laboratory schools should be the best available, and the length of the course such as to render the formation of correct habits possible. Care should also be taken to see that in the post-graduate life of the supervisor and teacher there be opportunities for further development and for contribution to educational science. The advantages of travel, observation of work in other schools, study of the best educational literature, attendance at teachers' conventions, etc., have been greatly underestimated.

3rd. Another and perhaps the greatest cause which has militated against the advance of educational science has been the belief that education is simply an art, that there is no such thing as a science of education and that consequently the laws, if there be any laws, governing educational procedure are to be derived from other sciences. It is held that if the teacher has had a thorough training in the cognate sciences, ethics, psychology, etc., he has when he begins to teach simply to apply the knowledge thus gained. Proceeding in this way

*See report of Department of Superintendence, N. E. A., Feb., 1902.

it is evident that any discovery that is made is made from the standpoint of the particular science studied and not from the educational standpoint.

Now, the results of the application of this theory to professional training are disastrous in many ways: (1) The time required to get a good working knowledge of all the sciences brought under contribution in education would require more than an ordinary lifetime; *e.g.*, so unimportant a subject as schoolroom temperature, subsequently referred to, demands some knowledge of experimental psychology, hygiene, physics, chemistry, architecture, etc. The student in training, then, in applying the foregoing principle without having considered the educational requirements sufficiently to know how much of each is essential, is almost certain to devote himself exclusively to some of these subjects and to neglect the others. (2) In such a course the emphasis laid upon the proper material from the standpoint of the science studied may attach importance to what is comparatively unimportant from the standpoint of education and partially or entirely ignore the points most requisite in the teacher's preparation; *e.g.*, a knowledge of the Alrutz theory* regarding cold, warm, hot and smarting-pain sensations, while absolutely necessary for anything like an adequate knowledge of the subject of temperature from the standpoint of experimental psychology, would be of little or no value in the treatment of an actual schoolroom case. The fact that the thermometer affords the only safe criterion for temperature is of slight importance in psychological science and would be referred to only incidentally if mentioned at all, and yet, as we shall see later, a working knowledge of this fact is necessary in educational work.

It is not implied in this that a definite and thorough training in such subjects as physics, psychology and hygiene *per se* is not a desirable and necessary preliminary for the

* See *Mind*, Vol. VI (1897), p. 445, Vol. VII (1898), p. 141.

teacher's work. The argument is that the teacher in training must be judicious in selecting how much of each of these is essential and how much is merely desirable. He cannot know all that he would like to know, or that under other conditions of life he could and ought to know, but he can come up to the measure of his present possibilities with due regard to all his existing conditions as best he can determine them.

Again, it is sometimes said, "There are a few underlying principles in educational theory; these can be easily memorized and subsequently applied." As a result of this view the training course sometimes consists simply in a memorization of principles and of methods of teaching.

Now, as I have endeavored to show there is no such educational theory independent of educational practice, and if there were it would be comparatively worthless.

I studied chemistry from a book for six months before seeing a chemical experiment performed, or performing one myself. I learned the names of the elements and their combining weights, memorized formulas, etc., and could repeat much of what was stated in the text-book. That, however, was not learning chemistry. When I came to investigate the subject in the proper way the residuum of my previous study, in so far as it was correct, was of some little value, but, for some reason or other, my incorrect attitude toward the subject had become habitual and it seemed well-nigh impossible to eradicate the old habit. On the whole, the preliminary text-book training did more harm than good, for it started me in the wrong direction.

"Do the thing and you will have the power" is as true in education as in any other department. There must be independent thought on the part of the teacher in training if there is to be real progress. While avoiding the errors of the follow-nature theory, and while making the best of all that the history of education brings to us, there must be

formed a habit of looking at things first hand, of lighting one's path by the lamp of personal insight.

The teacher's training-school of the future will be furnished with a library, a practice school, and a laboratory school in which the student can observe the highest type of work and in which investigations will be made from the educational standpoint, the conditions being such that the children will not suffer from such practice and experimentation.

In the earlier stages of the course emphasis will be thrown upon the inductive side. Students will begin with an independent investigation of the aims and ends of education. There will be some experimental psychology and child study and some comparison of different educational methods as students have already observed them. Before reading much pedagogical literature they will learn to adjust themselves to a consideration of educational investigation by summoning to the foreground of consciousness representations of their own past experiences which bear upon the work in hand. They will thus be prepared to proceed critically and rationally to a consideration of what has been done by others and, in the practice school, to test their conclusions and form correct habits by actual teaching under supervision.

Illustrations.—The two following examples are explanatory of ways in which educational technique may be discovered and utilized in professional training-schools.

I. *Schoolroom Temperature.*—Of the methods adopted by teachers in the regulation of the temperature of their schoolrooms the following may be taken as typical:

(*a*) The teacher pays no attention to the subject. He is physically robust and has accustomed himself to rigorous discipline. He is absorbed in his work and does not notice extremes of temperature.

(*b*) The teacher is sensitive to abnormal thermal conditions, but he considers only his personal happiness regardless of that

of the children and relies entirely upon his own feelings as the standard. If he feels too warm he opens a window at one side of the room and a door at the other side and turns off the heat. He then forgets all about temperature until he finds himself beginning to shiver with cold. He then closes the door and the window and turns on the heat. He continues to repeat this process from hot to cold and back again to hot perhaps a dozen times during the day.

(*c*) The teacher has studied the subject of heating and has made a hobby of it. He can do nothing and will allow the pupils to do nothing unless the temperature is within a narrow limit of a few degrees. He is constantly consulting the thermometer and the pupils and making changes in the heating and ventilation. He has not gained control of the subject; he has permitted it to take possession of him.

(*d*) The teacher succeeds in keeping the room properly ventilated and at a normal temperature without appearing to give the matter special concern. In fact, to a casual observer he seems to pay no more attention to the subject than the teacher referred to under the first category. There is, however, a very great difference. The teacher of this type has learned the necessity for controlling the conditions and the methods of control. He enlists the wise coöperation of his class. He sees that there is a reliable thermometer easily accessible. He is familiar with the heating and ventilating apparatus placed at his disposal, etc. In other words, in so far as this part of his duties is concerned he is proceeding *scientifically*.

Let us now enquire how a teacher in training may acquire such attitude and power.

1. *Importance of the Problem.*—The first step is to familiarize oneself sufficiently with the facts to make sure that the subject is one which is of actual importance to the educator and not of an imaginary or trivial character. A brief consideration of such facts as the following should be sufficient

to show that the subject is one which cannot be wisely ignored by the teacher:

Sudden changes in temperature are usually attended by danger and have often resulted in severe illness and death. As a rule extreme sensations of heat and cold resulting from sudden changes of temperature cannot be inhibited and they, therefore, render satisfactory study impossible. By slowly increasing or diminishing the temperature these extremes may be reached without the conscious notice of the pupil. The abnormal condition is accompanied by certain well-defined physiological characteristics; *e.g.*, flushed face, etc. The results of experiments show that under such conditions the functioning power of the system is retarded and that the accompanying symptoms bear a striking resemblance to those of overfatigue. Further, the question of heating is closely bound up with the more important problem of ventilation, and the teacher cannot properly deal with the one unless he understands the other.

Now, the argument is not that *every* experience which interferes with the educational process should be made the object of detailed investigation but that the difficulty here is of so serious a nature as to require such treatment.

2. *Methods of Observation.*—Having satisfied himself that there is a problem demanding attention, the student-teacher next proceeds to study methods of observation and response. The question is to determine ways to develop technique, which will enable the teacher to properly diagnose the case. Considerable scientific material is available in this connection. Medical authorities are pretty well agreed, as the result of experience and investigation, that the best temperature for a room under ordinary schoolroom conditions is from sixty-three to sixty-nine degrees Fahrenheit. Any temperature between these limits may be considered normal, although certain factors may enter in to change these limits; *e.g.*,

in a room where all are taking physical exercise the temperature should be lower.

Rubner (*Lehrbuchder Hygiene*, sec. 5, ch. 2, page 157), says:

"In reference to the hygienic demands the first question is *to what degree* our houses should be heated. This varies according to the conditions of the bodies of the inmates. With muscles at rest and with light clothing high degrees of temperature are necessary. For a person who is working, or who is wearing heavy clothing, low temperatures are sufficient. A hungry person, one who is poorly nourished, easily freezes, while a well-nourished person, with a well-developed layer of fat, is comfortable. Cold and heat sensitiveness varies; one may become accustomed to a higher or lower temperature of the air. *The simple feeling of comfort*, however, does not demonstrate the suitability of a certain temperature.

"With the *clothing* customary in our latitudes, also with a relative humidity of 40 to 50 per cent., living rooms and schoolrooms should have 17 to 19 degrees C. (62.6 to 66.2 degrees F.), nurseries, 18 to 20 degrees C. (64.4 to 68 degrees F.), sleeping rooms 14 to 16 degrees C. (57.2 to 60.8 degrees F.), sick rooms 16 to 20 degrees C. (60.8 to 68 degrees F.), workshops and factories, according to the kind of occupation, 10 to 17 degrees C. (50 to 62.6 degrees F.), gymnasiums 13 to 16 degrees C. (55.4 to 60.8 degrees F.), theaters, concert halls and ball rooms 19 to 20 degrees C. (66.2 to 68 degrees F.).

"The determination of the proper temperature will always present difficulties, as only rarely attention is paid to the proper choice of clothing, and the differences in clothing, apparently insignificant to the lay person or one less observant, are generally perfectly sufficient to explain the various opinions on the comfort of the temperature of heated rooms. Humid air is felt as warmer than dry air in medium and high temperature.

"One can readily comprehend from the above remarks that in the *unequal occupations* of the persons in one room, for instance, in the absolute rest of one, and the performance of work by another, it is difficult, even impossible, to find a temperature suitable to all. If in a schoolroom a temperature is maintained, agreeable for the pupil, the limits of endurance of temperature by the teacher, who must exert his muscles, will have been reached."

In discussing the same subject from the schoolroom standpoint Dr. Burnham says (*Pedagogical Seminary*, Vol. II, p. 31): "In this country it seems necessary to have the temperature

of the schoolroom nearly seventy degrees Fahrenheit. It should never exceed this, and, with adequate ventilation, may be less. Mr. Rafter investigated the temperature in the schoolhouses in Rochester some years ago. By a preliminary test he found great variations in temperature in different rooms. 'The schoolrooms, numbering more than two hundred, were then supplied with thermometers and the teachers carefully instructed as to the manner of taking observations, etc. The observations were taken ten times a day for one week.' His observations led to the conclusion that 'the temperatures invariably increase as perfection in ventilation decreases.' In well-ventilated rooms where the temperature ranged from sixty-two to sixty-six degrees the teachers usually testified that they found the rooms too warm when much above sixty-six degrees."

Another point of importance concerns the humidity of the air. Experiments made by De Chaumont and others indicate that in England the moisture in air of standard purity is about seventy-three per cent. of saturation. Investigations in this country indicate that the humidity in pure air in our climate is much less.

In addition to the assistance derived from the study of the best medical and educational literature which has been written on the subject, the student will receive valuable aid from an investigation of heat and temperature as outlined in standard books of physics and physiological psychology and from individual experimentation.

Such reading and experimentation should, if possible, be supplemented by the definite personal investigation of some phase of the problem.

As an illustration of such research work I submit the following outline of a series of experiments. My purpose was to determine to what extent it is safe for the teacher to trust to the temperature sensitiveness of himself and pupils without consulting a thermometer.

The first series consisted of nine tests taken in a normal-school class of one hundred teachers in training, all of whom

had had a teaching experience of at least one year. In every case the student was asked to make an independent guess of the temperature of the room. An effort was made to eliminate every factor which by way of suggestion or otherwise would interfere with the accuracy of the results. With the exception of the first test the tests were made in pairs, the first of each pair being made soon after the class entered the room and the second test half an hour later, the temperature having changed during the interim.

1st. The following is a summary of the nine hundred guesses made: *

TESTS.	Actual Temperature of Room in Degrees Fahrenheit.	Average Guess Made by 100 Students.	Lowest Guess Made.	Highest Guess Made.
Test 1.—Fifteen minutes after students entered room...	70	62	50	73
Test 2.—Five minutes after students entered room..	68	71	65	80
Test 3.—Thirty minutes after Test No. 2.....	72	69	65	72
Test 4.—Fifteen minutes after students entered room...	69	68	62	71
Test 5.—Thirty minutes after Test No. 4.....	64	68	62	75
Test 6.—Fifteen minutes after students entered room...	62	70	65	75
Test 7.—Thirty minutes after Test No. 6.....	68	71	66	87
Test 8.—Fifteen minutes after students entered room...	65	66	63	68
Test 9.—Thirty minutes after Test No. 8.....	73	69	65	73

*I am indebted to Professor Angell of the Department of Psychology in the University of Chicago for suggestions regarding methods of experimentation, and to J. H. Putman, B.A., Headmaster of the Provincial Model School, Ottawa, Canada, and other members of the staff of the Model School, for data summarized in this report.

By comparing the average results at the expiration of thirty minutes of gradual change of temperature with those at the beginning we find:—In Experiments 2 and 3 an increase of 4 degrees was considered a decrease of 2 degrees; in Experiments 4 and 5 a decrease of 5 degrees was considered as no change; in Experiments 6 and 7 an increase of 6 degrees was considered an increase of 1 degree; in Experiments 8 and 9 an increase of 8 degrees was considered an increase of 3 degrees; in Experiment 8, where there had been an increase of 8 degrees in 30 minutes, no student guessed a decrease; 84 students guessed an increase of less than 5 degrees, and no student an increase of more than 6 degrees. The results seemed to indicate pretty clearly: (1) That ability to guess temperature improves with practice. (2) That within normal limits an increase or decrease of five degrees in half an hour cannot be detected by the feelings.

2nd. The second series of tests was along similar lines and included three school classes in addition to the teachers' training class. The following is a summary of results:—

Number of pupils taking the test	31 Girls.	35 Boys.	33 Boys.	57 Boys.	100 N.S. Students	101
Average age of pupils	12 yrs.	10½	10½	12	24	
Number of minutes elapsing from time when class entered room until test was taken	30	40	30	45	40	35
Number of Fahrenheit degrees of change in temperature during this period	63 to 68½ +5.5	63 to 69 +6	67 to 58 −9	61 to 74 +13	65 to 70 +5	75 to 67 −8
Number of pupils who thought there had been no change in temperature.	10	30	33	0	90	50
Number of pupils who thought the room had become warmer	19	5	0	32	10	3

Number of pupils who thought the room had become colder.....	2	0	0	25	0	48
Number of pupils who said that before their attention was drawn to it they had noticed that the temperature was growing uncomfortably warm.....	15	10	0	28	0	0
Number who said they had noticed it as growing uncomfortably cold	0	0	0	0	0	0
TEACHER'S OPINION.						
Temperature at which some pupil would notice rising temperature as "too warm"		73+		69+	68+	
Temperature at which the majority of the class would notice it		77+		71+	70+	
Temperature at which some pupil would notice falling temperature as "too cold".....		58–		64–	65–	
Temperature at which the majority of the class would notice it		55–		62–	63–	

These experiments tend to establish: (1) That under ordinary conditions one cannot guess the temperature of a room with sufficient certainty to warrant one in relying upon heat and cold sensitiveness as a proper guide to the regulation of schoolroom temperature. (2) That as a general rule an increase or decrease of five degrees in half an hour cannot be detected by either teacher or pupil under ordinary schoolroom conditions.

Now, a further investigation will show that there are certain characteristics, *e.g.*, nervousness or drowsiness on the part of

the class, which will suggest to the observant teacher that the temperature is not normal. Nevertheless the thermometer is the only safe guide. We, therefore, conclude that in every schoolroom there should be an accurate thermometer, properly placed, and that it should be referred to frequently.

3. *Methods of Response.*—Having learned how to detect the abnormality the teacher in training next proceeds to an investigation of ways of correcting the evil. Anything like a detailed statement of the best methods of correction would lead us too far afield for the present discussion.

Speaking generally, the teacher should be familiar with the physical and chemical science bearing directly on the problem; *e.g.*, the principles of convection and of gaseous diffusion. the composition and density of air, impure and pure. He should have a practical knowledge of the best means of heating and ventilation that have been discovered, should know how to obtain the best possible results with such apparatus as he has, and be able to suggest or make improvements when necessary. In short, he should understand the entire situation in so far as it has immediate relation to the problem in hand.

To recapitulate, in the investigation of any phase of educational technique there is, in the first place, the determination of a working conception of the true aim of education. We next seek for means by which to control this process in order to attain our end. The focus of the system is always a break in experience which requires reconstruction. The point of greatest breakdown may be, as in this particular example, a negative consideration, a way of relieving a barrier to the fluidity of the process. The teacher says, "This room is too hot;" she means, "This is a situation which interferes with the educational activity in hand and this system of experience requires reconstruction."

Such problems are constantly arising and one duty of a training course is to prepare the student-teacher to cope with

such difficulty. The aim determines the problem. All problems are not equally important. There are certain difficulties which must be solved in some way by every teacher in every grade from kindergarten to university. The example taken—that of heating and ventilation—belongs to this common class. It is far from being the most important kind of problem but, although comparatively commonplace, it is of sufficient importance to render it necessary that every teacher should spend some time in its investigation.

The determination of the necessity for the consultation of a thermometer is but one of the many phases of the problem of heating and ventilation and is, therefore, relatively of even less importance.

The foregoing detailed outline of investigation regarding it is submitted simply as suggestive of treatment which may be adopted regarding countless minor educational problems which are still unsolved and which can be profitably worked out by a training class without serious interference with the regular work of the school.

II. *School Government.*—Wherever there is a class there is a social institution in which the teacher and the pupils participate. The unity of life gives the law equally to the one and to the other, just as in the family or in any other social institution. There are certain duties and privileges pertaining to teacher and to pupil respectively, and these have been investigated on the theoretical side, and scientifically tested by careful and long-continued experiments. There are thousands of definite principles to be found in standard works on the subject, whether treated generally as in books on ethics, sociology, political economy, etc., or pedagogically as in books on school organization and management and the history of education, which are endorsed by all who have investigated the subject.

These principles or rules do not exist as static pigeon-holes into which the teacher can fit each experience. They are

valuable only in so far as they serve as instruments of insight in clarifying the given situation. They aid common sense; they do not displace it. This is, perhaps, most clearly illustrated in the treatment of school discipline, the rock upon which so many young teachers make shipwreck. To take a simple example, it is a universally-admitted fact that "human nature is such that there is no surer or swifter way to secure disobedience on the part of a child than to command him to perform certain acts and then to allow the acts to remain unperformed." An extreme violation of this principle is seen in the conduct of those who flippantly demand improper or impossible things and then treat the matter lightly or jestingly when the child disobeys. But it is sometimes affirmed as a corollary to this principle that if a teacher gives a command in good faith and afterwards finds that he was in error he should adhere to his original position for fear of *weakening* his *discipline; e.g.*, a teacher insists upon the mispronunciation of a word or gives an incorrect mathematical solution or issues an unwise command or blames an innocent pupil and afterwards discovers his mistake. The question is, Should he endeavor to rectify his error? This is no imaginary case. Where is the teacher who has not had some such experience?

Now, if the principle to which I have referred has been learned from a book as a final rule to be applied without examination of the needs of the particular situation, its effect in this instance will be to interfere with the general aim of the school and probably to defeat the very purpose for which the rule is applied, viz., the preservation of good discipline. Further, it may prove a strong temptation to the teacher to perform what is really from the negative standpoint an immoral act, by serving as a cloak for leaving undone what ought to be done.

This apparently extreme exception when properly analyzed is found to be in entire accord with the rational application

of the general principle quoted. The teacher who corrects his error in a quiet, manly way does what is best for the community under the circumstances and conforms to a principle which underlies this and every other ethical law. It does not follow that he must adopt a course of perpetual apology for every trifling act which is not ideally perfect, nor that he is to proceed upon a vacillating method of administration, nor that he shall consider it a light matter to make such blunders in the future. The law comes in to emphasize the necessity for greater knowledge and deliberation and is itself enriched by the possibility of its application to this new case.

"Love of children" and "common sense" are invaluable elements in the makeup of a successful disciplinarian, but the majority of failures in discipline are not traceable to a lack of either the one or the other. Such failures are usually due to a hazy conception, or misconception, of the proper social relations existing between teacher and pupils, to ignorance of what ought to be done under conditions which are almost certain to arise, and to the adoption (in an unexpected crisis, on the spur of the moment, by sheer force of imitative habit) of a method used by some former teacher under entirely different conditions—a method which at best was, perhaps, a very poor device. In other words, the teacher fails because he has not investigated the subject sufficiently to be able to anticipate the difficulty and deal with it when it arises.

So long as human nature and social conditions remain as they are, teachers of large classes, especially those in elementary schools, are likely to meet with cases of lying, truancy, stealing, etc.; and a preliminary investigation of particular cases, real or imaginary, will save them from many serious mistakes.

Further, the teacher's failure in discipline often arises from ignorance of the actual attitude of the members of the class

toward ethical questions, and a natural tendency to consider that the aims of pupils are lower than they really are, and to forget that the immediacy of the social life of the schoolroom renders decisions upon ethical questions a necessity for the pupil and affords him an opportunity for observation of details outside the range of the teacher's vision, and renders decisions upon ethical questions a necessity.

The mode of development of the technique of educational science in one phase of educational work does not differ fundamentally from that in any other department; *e.g.*, the teacher in training gains an insight which will enable him to grapple successfully with difficulties in school government by a method similar to that suggested for gaining control of the problem of school temperature.

There is the investigation of the general problem of school government and a selection of difficulties which really require investigation. There is on the historical side a study of the best available literature on the subject, and on the practical side an experimental investigation of concrete cases to know what ought to be done by teacher and pupils and what is the attitude of children toward the problem.

The following may serve as an illustration of the way in which such experimental investigation may be conducted:

Some years ago with a view to determine the attitude of children toward the subject of "talebearing" I sent a series of questions to a number of teachers with the request that they submit them to their pupils. Replies were received from one thousand four hundred and sixty-nine persons from schools in various localities. The answers were written by pupils during composition hour; no comment was made by the teacher. One hundred and six replies were received from teachers in training, one hundred from high-school students, and the remaining one thousand two hundred and sixty-three from public-school pupils.

The following case was proposed for consideration:

"John throws a snowball through a pane of glass in the schoolroom window. James sees him do it. No one else sees him do it. They know that if they report the case the only punishment will be that John will be required to pay for a new pane of glass."

Pupils were requested to answer "yes" or "no" to each of the twelve questions proposed and to give their reasons.

1st Question. "Should John tell on himself if the teacher asks him if he broke the pane?"

2nd. "Should John tell on himself if he is not asked?"

3rd. "Should James tell on John without waiting to see if John is going to tell on himself and without being asked to tell?"

4th. "If James is asked to tell, should he tell without waiting to see if John is going to tell on himself?"

5th. "If John does not tell on himself should James ask him to tell?"

6th. "If John then refuses to tell, and James is not asked to tell, should James tell?"

7th. "If John refuses to tell, and James is asked to tell, should James tell?"

8th. "When the teacher finds that the pane of glass is broken should he say to the class that he wished the boy who broke it to report privately?"

9th. "If the boy does not report privately should the teacher try to find out who broke the pane of glass?"

10th. "Should he ask each boy if he broke the pane?"

11th. "Should he ask each boy if he knew who broke the pane?"

12th. "If every boy says he did not break the pane, and James says he knows who broke it, should the teacher ask James to tell who broke it?"

These questions as outlined were subsequently discussed at large assemblies of teachers and the greatest diversity of

opinion was expressed. A number said that they believed "the quietest way to be the best" and that they made it a rule in discipline to avoid all disagreeable matters; in the case quoted they would simply see that the furniture was replaced at the expense of the community and would ask no questions. Some said that under no conditions would they allow tattling in school; they made it a rule always to punish any pupil who informed on another, no matter what the circumstances might be. Others held that it is the duty of everyone to see to it that the one who does the damage pays for the repairs; they acted on the principle that "to conceal crime is to abet crime" and they made it a rule always to punish a pupil who withholds information under such conditions as those in the particular case proposed. In other words, in some cases, at least, the solution had been arrived at and acted upon with little or no deliberation on the part of the teacher.

On the other hand, the written answers of the thirteen hundred high and public school children near the adolescent period showed that they were practically unanimous in their assent to the following statements:

1st. The cost of repairs to school property damaged by a pupil should be borne by the pupil or his parents, and should not be imposed upon the other school supporters.

2nd. The punishment by "discipline of consequences" in the particular case proposed is a *just* punishment.

3rd. It is the duty of the pupil who does the damage to inform the proper authorities in order that repairs may be made and that the community shall not suffer.

4th. It is the duty of the teacher to endeavor to have the repairs made by the proper party.

5th. What boys call "a row in school" is a very disagreeable thing and should be avoided.

6th. "Tattling" is a selfish and cowardly habit, not to be tolerated except in case of little children who "do not know any better."

7th. It is a "mean thing for a boy in such a case not to tell on himself and so leave it that the property may not be repaired and other boys may be placed under suspicion."

8th. Every case should be decided on its own merits and not by some fixed and inexorable law.

A pupil twelve years old in answer to one question naïvely remarked, "Whether the boy who saw the furniture broken should tell or not might depend on how *large* the other boy was."

This example is not taken to prove that pupils always know what is right or that they always act up to the full extent of their knowledge. It may be said in passing, however, that the wider and more continued one's experience has been the more likely one is to have faith in the ideals of children and to trust to their sense of honor.

Nor is the illustration offered as a form of child study to be adopted without consideration. There are sacred temples within the citadel of the soul which should not be rudely entered. It is possible that much of the so-called ethical study of children should never have been carried on, and that the results are at best only a test of the peculiar tenets in vogue in the social environment of the child.

Many of the criticisms on such study, however, proceed on the assumption that those who do not believe in the training of teachers never make mistakes of this kind. I have seen one of these untrained experimenters spend an entire afternoon with a class of fifty pupils investigating in minute details the *pros* and *cons* of a fight which had occurred on the school ground at noon. As a result of the experiment a dislike for school was created on the part of the pupils, and

on the ethical side the influence tended rather to immoral habit than otherwise. A trained expert would have gained by private interview in five minutes a more adequate view of the situation than this teacher gained in two hours.

The methods of discipline resorted to by the untrained teacher in "getting experience," often mar the harmony of the schoolroom and injure innocent pupils, who are compelled to gaze in trembling and humiliation upon scenes which stamp their impress indelibly upon the memory.

No doubt the teacher improves by the experience thus gained and regrets the mistakes of the formative period, but what about the *children?* A careful record of such irrational experiments, if it could be secured, would prove a convincing argument in favor of a judicious form of child study, and of a proper preparation on the part of teachers.

There are many whose opinions are worthy of careful consideration who agree with the statement that "teachers who know nothing of the reflective aspects of their calling, who do not try to comprehend as well as to love their pupils, who despise science because it cannot take the place of devotion and of instinct, may be successful teachers." So far as I have been able to observe, however, such teachers invariably fail when put to the test of actual experience.

The conditions of an ordinary elementary school class—and it is to such a class that the principle is supposed to be especially applicable—are usually such as to test to the utmost the resources of the thoroughly-prepared teacher both as regards presentative material and methods to be applied. The teacher who before being placed under such conditions depreciates the efforts of former teachers, and imagines that an abstract principle of love will be sufficient to carry him over all obstacles, resembles Kant's "light dove which, piercing in her easy flight the air and perceiving its resistance, imagines that flight would be easier still in empty space." If he really

loves children he discovers his error and endeavors under circumstances of greatest difficulty, and often at the expense of his vitality, to correct his mistake.

But after all is it possible for a teacher to "love pupils, without trying to comprehend them"? Does not true love always express itself in an effort in some way to be of service to the object of its affection? This means a sympathetic interest which implies a willingness to put oneself in the place of the one to be helped and to see things from his standpoint, and surely this cannot be done without an effort to understand the situation.

There is a better way than that adopted by the teacher who relies entirely upon the love instinct, on the one hand, or that adopted by the superficial pedant who works entirely by copied rules, on the other.

One of the functions of a teacher's training-school, as I understand it, is to prevent either of these classes from attempting to teach. A training course should be only for those who do possess natural aptitude for teaching. It should enable them to combine love's individual liberty of action with the insight gained through training and experience, and so the more nearly to attain the lofty ideal of a true educationist. This implies an ability, as each of the endless contingencies of school life arises, at once to select the best possible line of conduct having in view past experience, the present needs of the situation and the development of the child for his subsequent place in the social structure.*

*For other examples of similar investigation by the author see:

(*a*) "Schoolroom Fatigue," *School Journal*, New York, 1896, p. 573.

(*b*) "Ethics of Talebearing," *Proceedings Ontario Educational Association*, Toronto, 1898, p. 238.

(*c*) "Canadian Normal Schools," *Pedagogical Seminary*, Clark University, 1894, p. 461.

Summary.

In the foregoing argument I have endeavored to establish the following:—

1st. In considering the meaning of the term "science" emphasis should be placed upon the functional or dynamic phase of science as furnishing a carefully-constructed instrument of control by which future advance will be rendered less difficult.

2nd. If we adopt a functional criterion for science and education it follows that a science of education is possible.

3rd. Educational science is not an application of any other science or group of sciences but is itself an independent science with a technique of its own developed by an investigation of problems from a purely educational standpoint.

4th. The aims of educational science are formulated mainly upon an ethical basis; the means upon a psychological basis.

5th. All teachers should receive professional training.

6th. A good physique, natural aptitude, scholarship and culture, should be demanded as prerequisites to such training.

7th. The adverse criticisms usually urged against the professional training of teachers are chiefly due to four causes:

(*a*) A misstatement of the real question at issue.

(*b*) Lack of knowledge concerning the actual facts.

(*c*) Defects in existing training-schools.

(*d*) A static view of education and of science.

APPENDIX.

QUOTATIONS FROM REPLIES RECEIVED FROM UNIVERSITY PROFESSORS.

"SPEAKING generally, the first and most essential prerequisite for placing the training of teachers upon a scientific basis is insistence upon the most thorough and scholarly attainments in the subjects to be taught.

"In addition to that the more one can know of the history of education, and the organization of educational systems with their consequent results in the producing of men, the better and wiser teacher and administrator is one likely to be.

"There is at present too great diversity of opinion touching the 'true psychological gospel' of the educational process to render insistence upon assent to any one theory either justifiable or wise.

"Personally I believe that modern psychology with its pedagogical implications is of utmost significance for sanity and wisdom of procedure in elementary instruction.

"I think that such knowledge is, under the existing educational system in this country, of less moment as one goes upward in the educational levels, and, therefore, of least importance practically in university work. Even there, however, I think such knowledge undoubtedly conduces to judicious and intelligent method.

"It is not for a moment implied in all this that anyone can be converted into a good teacher by the employment of any method whatever. It is a question of simply securing the maximum of efficiency from specific individuals.

"The great teacher will still be born rather than made; he will in largest measure use sound methods in the actual conduct of his work instinctively."

"The normal school emphasizes method; the college insists on knowledge. The happy mean is best."

"When the public recognizes the lamentable deficiency of present methods it will demand better trained teachers. The recognition and the demand will come gradually. The present system is emphatically more desirable than no system, but it could be greatly improved in all grades."

"More can, must and will be done to make teaching a profession in the highest sense of the term."

"Modern pedagogical courses tend to save beginners from making the mistakes which their predecessors made and to learn like wise men from the failure of others."

"Professional training of the right kind and within proper limits is desirable for all teachers from the university down."

"For secondary, college and university teachers the first requisite is to *know the subject*, and the second to be endowed by Providence with common sense; a knowledge of the history of education, of psychology and of the art of teaching, are highly desirable, but by no means so desirable as the two requisites named above."

"Most normal schools emphasize methods regardless of whether the subject has been mastered. On the other hand, college teachers, while insisting on a thorough knowledge of subjects, often take but little pains in presenting subjects as they ought to be presented. There is a happy mean which would improve both classes of teachers."

"The teaching of methods and school routine is likely to do more harm than good. If the history of education and psychology are attempted they should not be the mutilated things they now are. They should form parts of general history and psychology in a true scientific sense."

"Experience in teaching should precede professional training."

"The present academic requirements for professional study should be raised."

"The pedagogical training in normal schools and universities is good only in spots."

"We cannot advantageously combine instruction in the subject-matter of knowledge and instruction in methods of communicating that knowledge."

"The main defect of teachers at present seems to be a lack of knowledge of the subjects which they undertake to teach."

"As a poor method becomes good in the hands of one who enjoys it, so a good method becomes positively bad when used by one who has not adapted himself to it."

"If a teacher has not a thorough knowledge of his subject, methods won't save him."

"The lessons which a teacher in training actually teaches under the observation and subsequent criticism of a competent and experienced teacher is, in my opinion, the only part of the present system that is of value."

"The great weakness is not in the training of teachers but in the political nature of appointments and the meagerness of salaries offered, which fill the schools with men of lesser qualities and with immature girls."

"Normal schools should confine themselves to the training of teachers for *elementary schools.*"

"University pedagogical training should be post graduate."

"I should not favor any sacrifice of scholarship to technical professional training."

"The good teacher is born not made. The best student is the best teacher. He who keeps up his enthusiasm for scientific truth and gives to it a personal interest in his students will be the most successful teacher everywhere."

"I do not believe there can be much profit in learning to teach a subject by one who is not proficient in the subject."

"Professional training for university teachers would be undesirable. It is better to depend on our present general method of subjecting the teacher to university training and taking the strong man when he is kind enough to turn up."

"The best training lies in working with a good worker and catching his spirit."

"The training of teachers is on the best scientific basis attainable when it includes the best of what is comprised in the courses leading up to the two degrees of A.B. and Ph.D."

"Teachers in elementary schools have not a sufficient background of information discipline in subject-matter. In universities there is lack of method. Every teacher should have a college education or its equivalent, some instruction in general educational problems and history, and, for most teachers, some training in technique. In cases where they have studied with good teachers and have natural ability the last element may possibly be omitted. Communities should pay enough to make it possible to demand these requirements."

"A fundamental and uniform system of training will not make a good teacher out of material which has no aptitude for it. Such training can only make a fairly-efficient grinding machine which in proportion to its success is the more fatal to the richer and subtler elements of character and individuality. A thorough, yet free and practical, study of mental and moral growth of personality in those to be taught is desirable."

"The present system, like almost all other things past and present, seems to be a mixture fairly satisfactory in some respects and more or less unsatisfactory in others."

"Professional training is very desirable, but it should be based upon, and not substituted for, an adequate general education."

"The danger here seems to lie in the petty little rattletrap idea that someone may please to call 'scientific basis.' Life

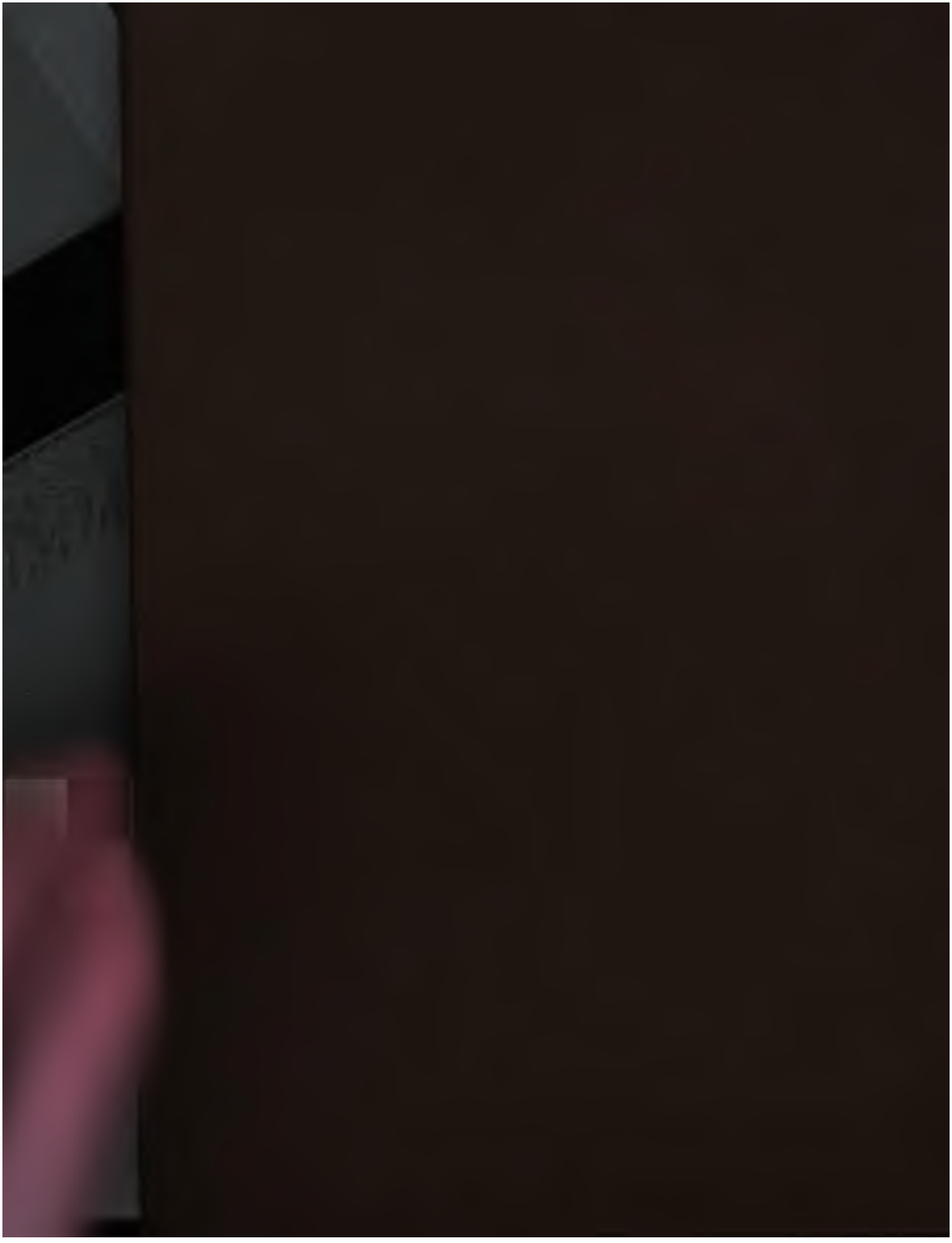
and nature, especially human nature, are too large and complex to be put into the 'basis' and when you think you have it, off it goes to higher and better things than the scientific basis ever figured on."

"Such training can be made scientific only in so far as psychology and ethics can be made scientific."

"Teaching is an art, as much so as the management of a military campaign, and the faculty for doing it—grading down from genius to ordinary knack of managing or getting on with young people—is of too fundamental a nature to be communicated to anyone. What he has can be improved and cultivated by proper training, especially by actual practice."

"The only science, in a reasonably strict sense of the word, should be the sciences which bear on pedagogy, physiology, psychology, hygiene, etc. These in most cases ought to be taught for the good of the teacher who is in the making rather than for the theory of the science in question. No knowledge of sciences alone can make a teacher, nor, on the other hand, any genius so great that training of the right sort would not be helpful."

"Teaching is an art, but every art has a scientific basis and it can be in a measure well taught."

"If 'scientific' means sound, methodical training which shall exalt personality in teacher and student I believe it will become increasingly possible, and it is an end worthy of great and persistent effort."

"No art that is so wealthy in its demands and in its relations to human needs as the art of teaching is will ever be put upon a purely scientific basis. We do not live by science alone, but by love, instinct, tact, and personal experience. These always transcend our science however the latter may grow. A wholesome, progressive training for teachers, with a due use of science, but without crystallization into a 'system,' will always be in order. The normal